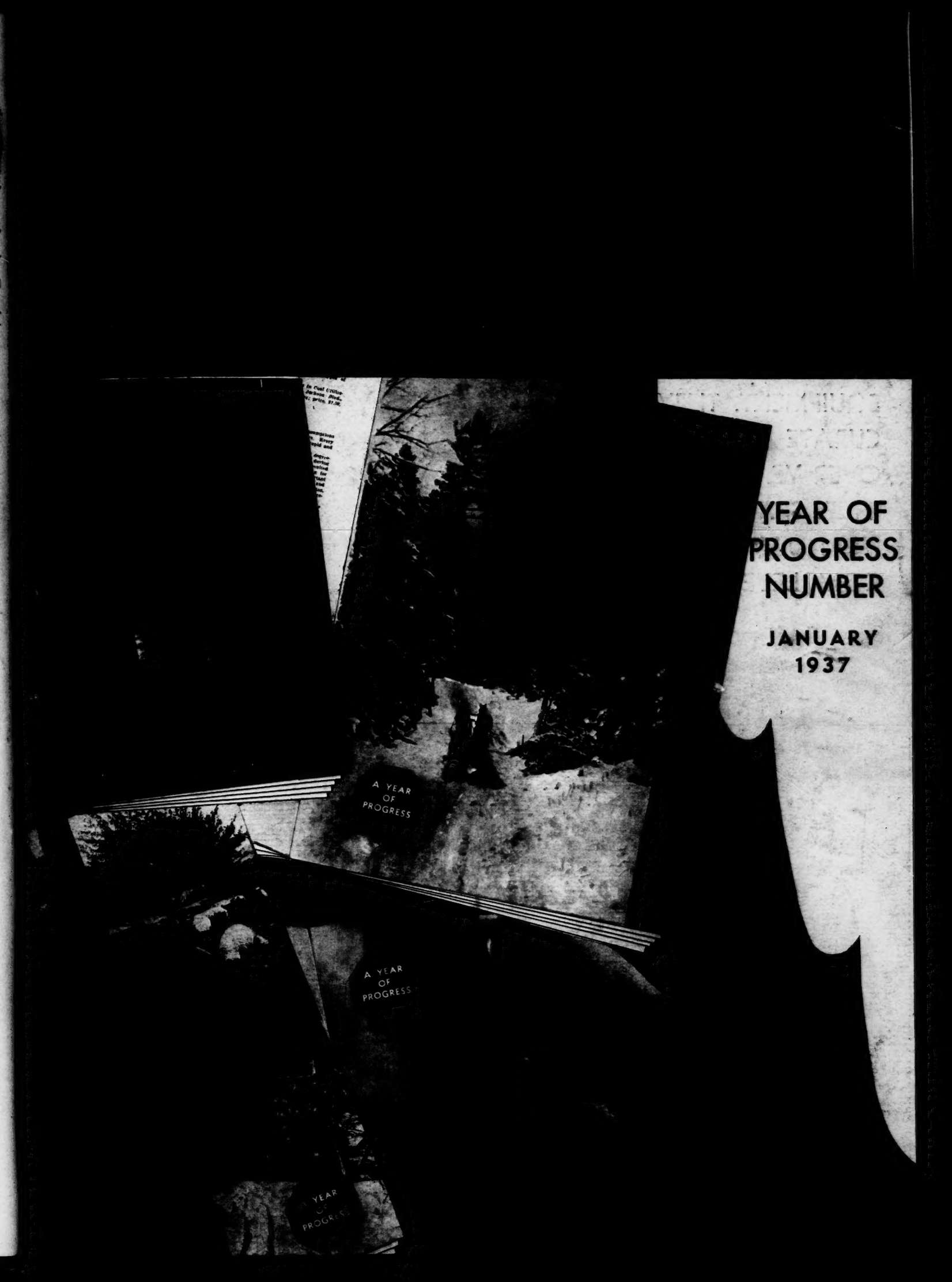
YEAR OF
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JANUARY
1937
A YEAR
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A YEAR OF PROGRESS

SUGGESTIONS FOR USING THIS ISSUE

This special Year of Progress issue is arranged in four principal divisions as the page index at the left shows. It is planned for continuous reading. To make best use of the material by all means first study the charts and graphs on pages 13 to 15. Then read on page 16 the explanation of how these charts are plotted and of the meaning which may properly be attached to them. This will give you a good overall picture of the year's business, of recent trends, and will indicate how things stand generally at the opening of the new year. It is best to have this background in mind before proceeding to any of the four main divisions of the subject matter.

Each subdivision deals with three phases. One is what we have called the commercial aspects and deals with sales volumes, markets and marketing methods, and similar subjects. The second phase takes up subjects of technical design and applicational engineering interest. The third presents a record of the new equipment which appeared on the market during the year.

The aim is not to cover all angles of every subject but is to be selective. The selection of subjects is governed by choosing those which are believed to be both timely and interesting. Limitations on this are fixed by the available information. On some subjects there is little or no really authentic information and rather than resort to pure opinion the subjects have been omitted entirely.

Read the whole subject matter thoughtfully and carefully. Comparative conclusions can be readily drawn from some of the data but do not overdo this use of the statistical material. Instead it should be used as a help in keeping your bearings and your balance as this industry continues to pass through a period of swift evolution.

Statements made throughout are the result of suggestions, opinions, and statements of fact drawn from a great many people in the industry, from printed material brought out during the year, from statistical reports, and from carefully compiled indexes. The editors are grateful for the generous response which their requests brought from so many busy people, and regret that space and a promise not to reveal names make it impossible to offer personal public acknowledgment.

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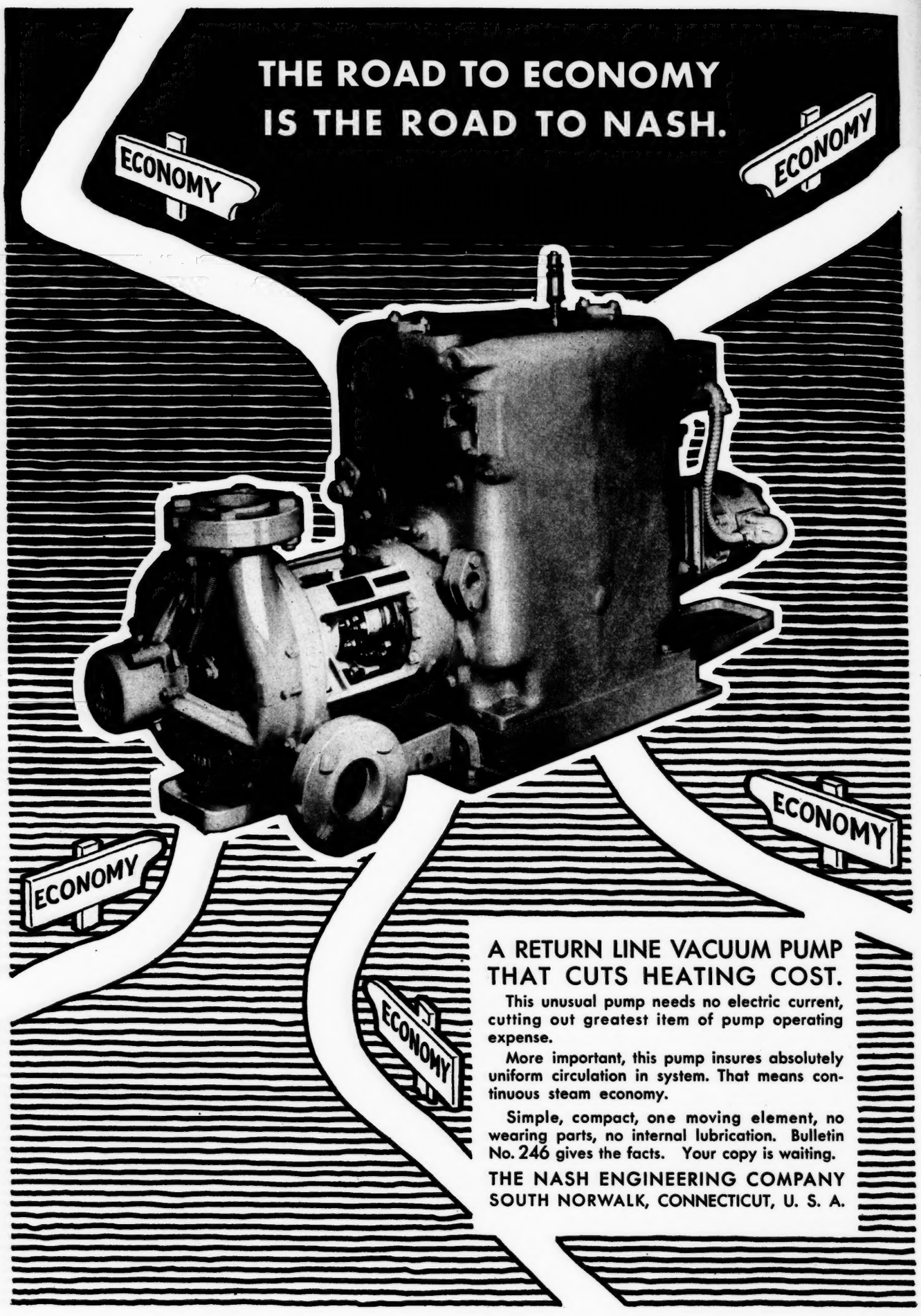
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1936—A Year of Progress
1937—A Year of Promise

WE have just passed through a year of good business. The volume rose more than 60% over 1935, and was 2.6 times as much as during the low year of 1933.

Now what about 1937? The best answer is shown by looking at the chart below. See the way the curve is climbing. Project it in a straight line through 1937 and the curve strikes near 100 on the vertical scale. That means that we should reach 1929 levels during 1937. This is a strictly conservative estimate too, for there is every reason to expect an accelerated rate of increase rather than a steady rate. That is why we refer to 1937 as a Year of Promise.

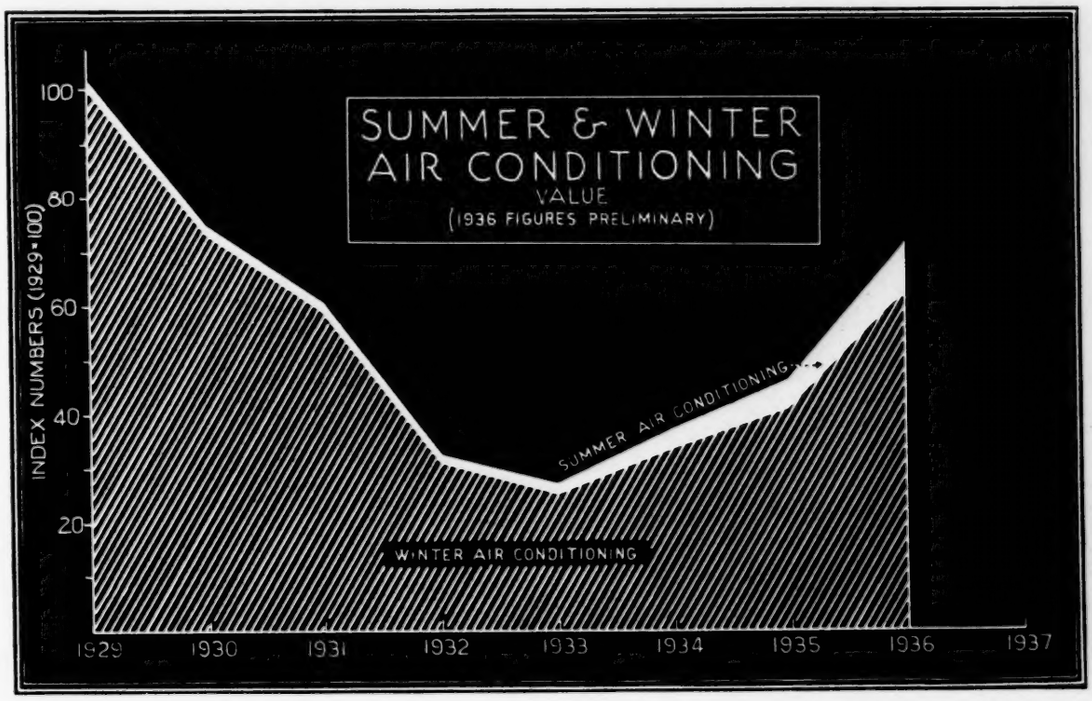
This chart is worth further attention. It is entirely new but compiled from tested data. It probably gives the best existing picture of what has happened to this industry in recent years. It might be captioned "Into and Out of a Depression." See how closely the upswing of the curve resembles the course of the downswing. The curves are plotted on dollar volumes and thus avoid the confusion which curves based on physical production so often bring about.

As you examine the chart keep in mind too that it shows the value to the consumer, not the value of equipment at the factory. It shows the factory value of the equipment plus all sales margins, costs and burdens, all necessary labor and materials to complete the plant on the premises of the owner, fully installed, adjusted, and ready to operate. Being plotted in index numbers with 100 at 1929, percentages of the 1929 value can be read directly. Percentages for any year can be readily computed.

For the first time the value of strictly summer air conditioning plants in buildings is plotted as a white band cutting off part of the total curve. This gives a graphical picture of how this branch of the industry has fared during recent years and also how large it looms at present in the total. Project it to 1937 in straight lines and this band cuts off about 15% of the total. Do not confuse this band with the total percentage of heating and cooling which is accomplished with air. This band shows only a part of such a total; namely, the part represented by plants which can accomplish summer cooling.

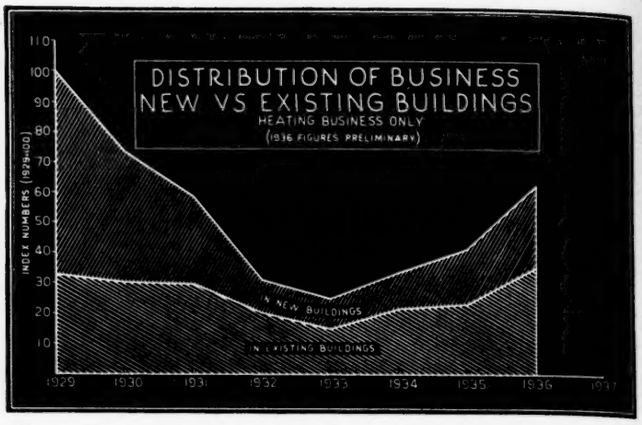
With this general picture of past and present values in mind you are now ready to examine similar curves showing what happened during this same period to various kinds of equipment in which many of us are specifically interested. Turn this page and you will see a series of 14 graphs also plotted for the years 1929 to 1936. These on the left (Nos. 1 to 7) show yearly totals only, while those on the right (Nos. 8 to 14) use monthly figures.

A fuller explanation of each of these individual curves and their meaning will be found on the next succeeding page.



ANNUAL TRENDS
1929 TO 1937

The charts on this page show the trends of business in different branches of the industry by years since the boom days of 1929. Charts 2-6 show the annual value of business—product of number of units times the average installed value—while No. 7 shows the cumulative values of stoker, oil burner, and gas heating business.



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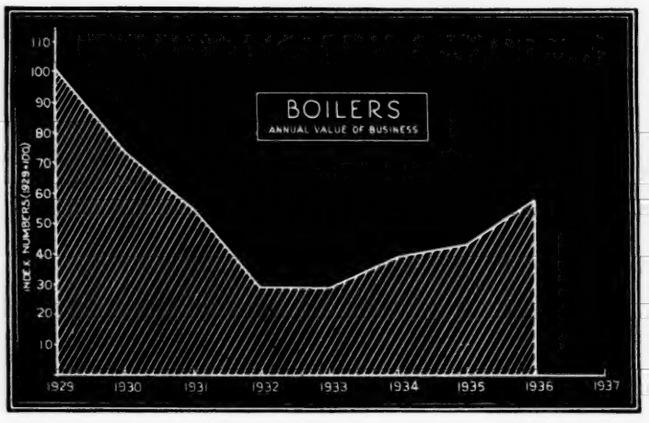

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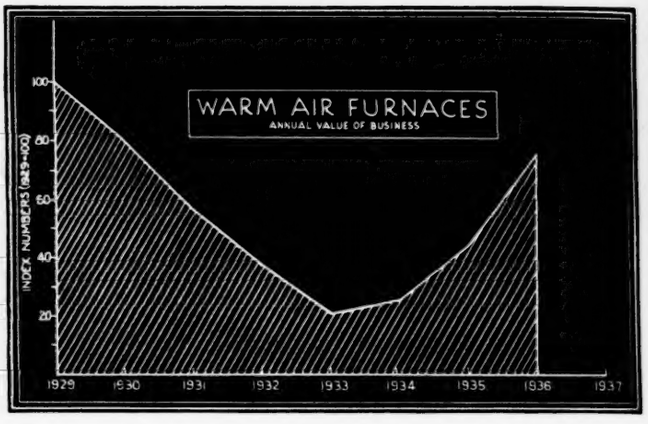

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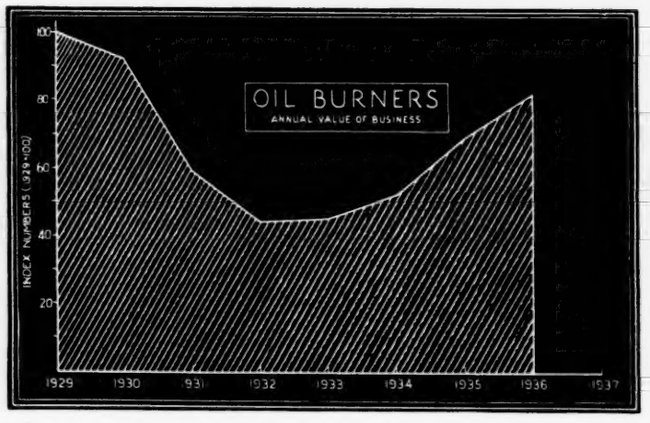

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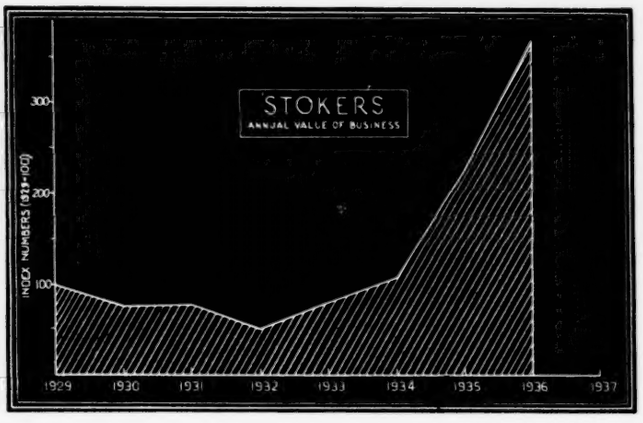

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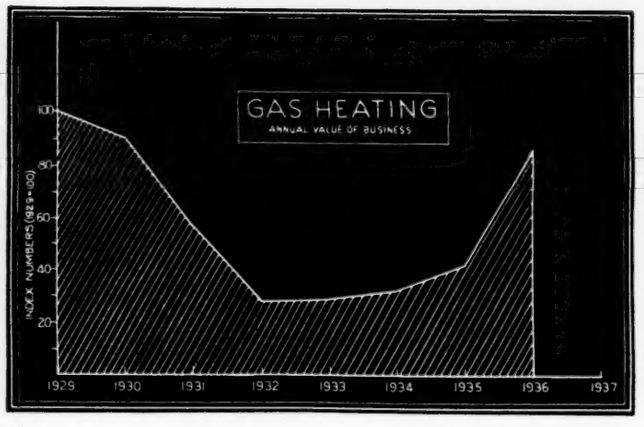

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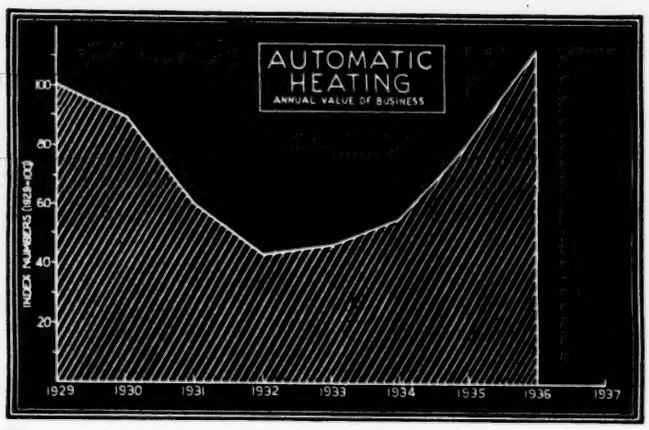
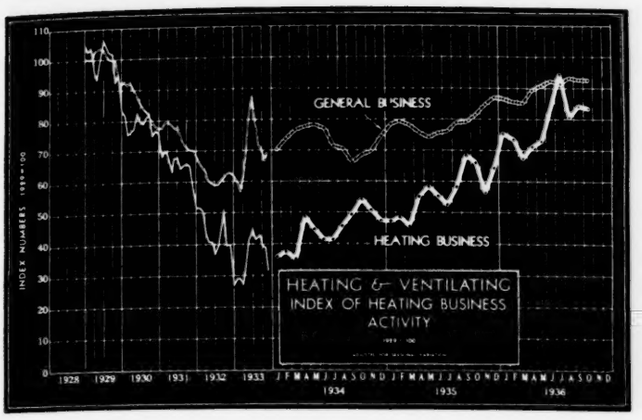


7

MONTHLY INDEXES
1929 TO 1937

The accompanying charts reflect almost at a glance business conditions month by month. Four of these charts are corrected for seasonal variation, while three—those on stock prices, heating equipment prices, and employment—are unadjusted. All of the curves show the strength of recovery since the low point of the depression in the winter of 1932-33.


GENERAL BUSINESS
HEATING BUSINESS
HEATING & VENTILATING
INDEX OF HEATING BUSINESS ACTIVITY
INDEX NUMBERS 1929=100
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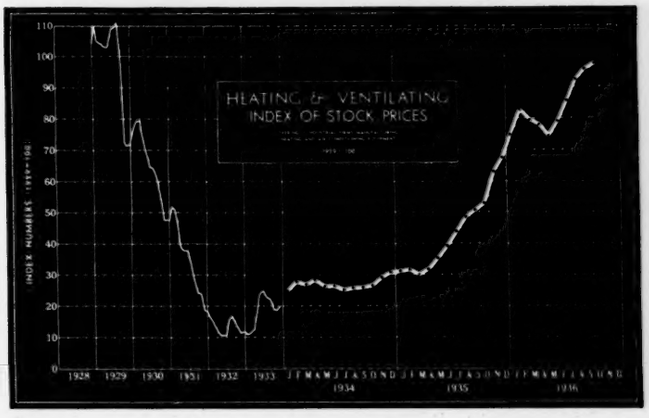

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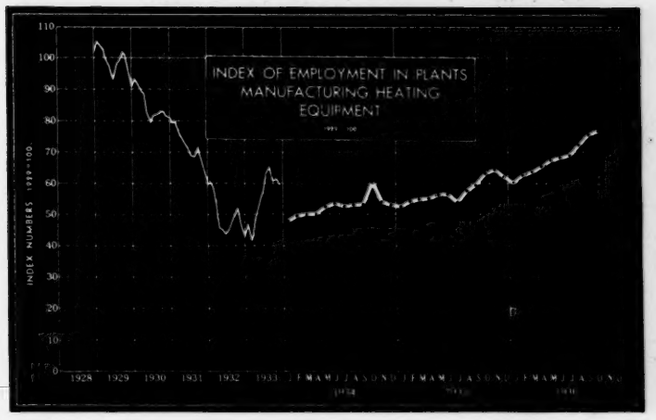

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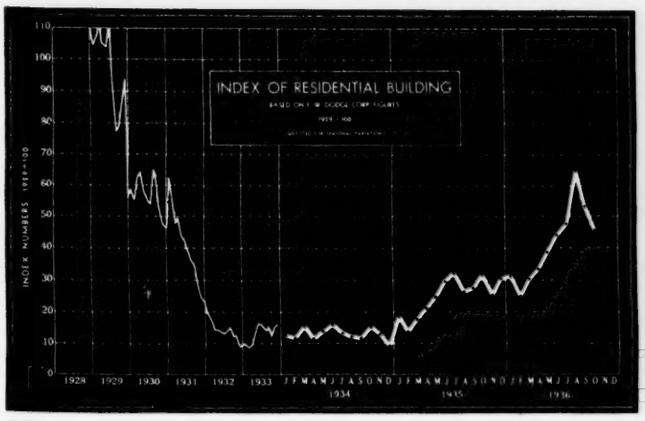

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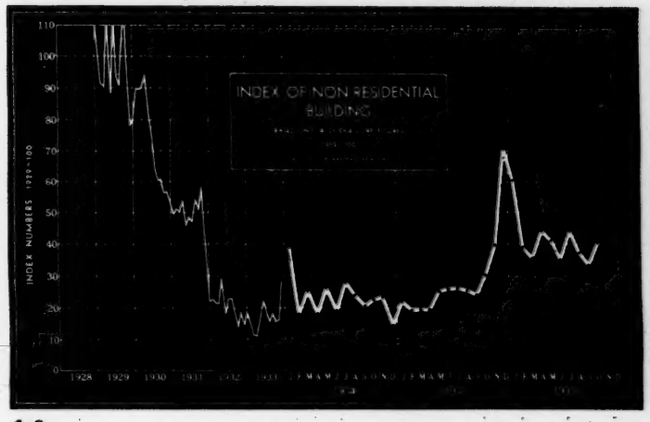


14

What "Annual Trends" and "Monthly Indexes" Show

Chart 1. Complete data have never been available for determining how much of the heating business comes from plants and equipment installed in new buildings and those sold for use in existing buildings for replacement of obsolete plants or worn-out parts. This chart shows this division of the business. It should not be taken as wholly accurate but rather as an approximation. It refers to the heating and winter air conditioning business only and does not include summer air conditioning. The chart brings out sharply how much more relatively important modernizing has been during the period from 1931 to the present time than it was during the boom days. It may be inferred that the reason for the continuance of the modernizing and replacement business during 1936 (when its volume is estimated to have exceeded even 1929 days) is due to the availability of money through the FHA insured loans.

Chart 2. This chart is a composite based on sales of cast iron sectional boilers, cast iron round boilers, steel boilers, oil burner-boiler units, and gas boilers. The available figures on steel boilers do not cover sales of units of less than 100 sq. ft. of heating surface as these are not reported by steel boiler manufacturers in most cases. Sales of these smaller units began to be an important part of the boiler business about 1932 and have become increasingly important since that time. With this exception the curve indicates the year-by-year progress of the boiler business. The curve shows the annual value of boilers, as installed, without allowance for radiators, specialties, and piping connected thereto.

If figures for the smaller steel boilers had been included the curve from 1932 up to 1936 would have shown a sharper rise.

Chart 3 shows the estimated value of warm air furnaces installed during recent years. It gives only the installed value of the heater and does not include the value of the ducts and registers connected thereto.

Chart 4. The sales of oil burners during the depression probably suffered the least of any of the major types of heating equipment. The curve does not show the total in number of installations but of the annual value of these installations, and thus takes into account not only the number of installations but their average price. As there has been a steady drop in the average installed price, the curve shows 1936 as being less important than 1929 although it was more important so far as number of installations is concerned. The curve, it should also be noted, indicates not only the value of mechanical and natural draft conversion burner installations but also those of boiler-burners and furnace-burner units.

Chart 5. This chart, showing trend of annual value of stoker business, also takes into account not only the number of installations but the average installed price which has been declining from year to year. This chart covers class 1, 2, and 3 stokers which include all units up to those burning 300 lb. of coal per hour. Industrial type stokers for burning over this amount are not included.

Chart 6. Accurate figures for the sale of gas heating equipment have not been available during recent years. The figures shown in Chart 6 are based on specific sales, where available. Where not available they are based on increases or decreases as reported by a large number of utilities. The chart covers the annual installed value of gas boilers, furnaces, and conversion burners.

Chart 7. This chart is a composite of the figures shown in 4, 5, and 6, based on annual value of business.

Chart 8. These curves show HEATING & VENTILATING's Index of Heating Business Activity plotted month by month and corrected for seasonal variation as compared with general business also plotted from month to month and corrected for seasonal variation. It should be noted that the heating business curve applies only to heating and does not include activity in ventilation or summer air conditioning.

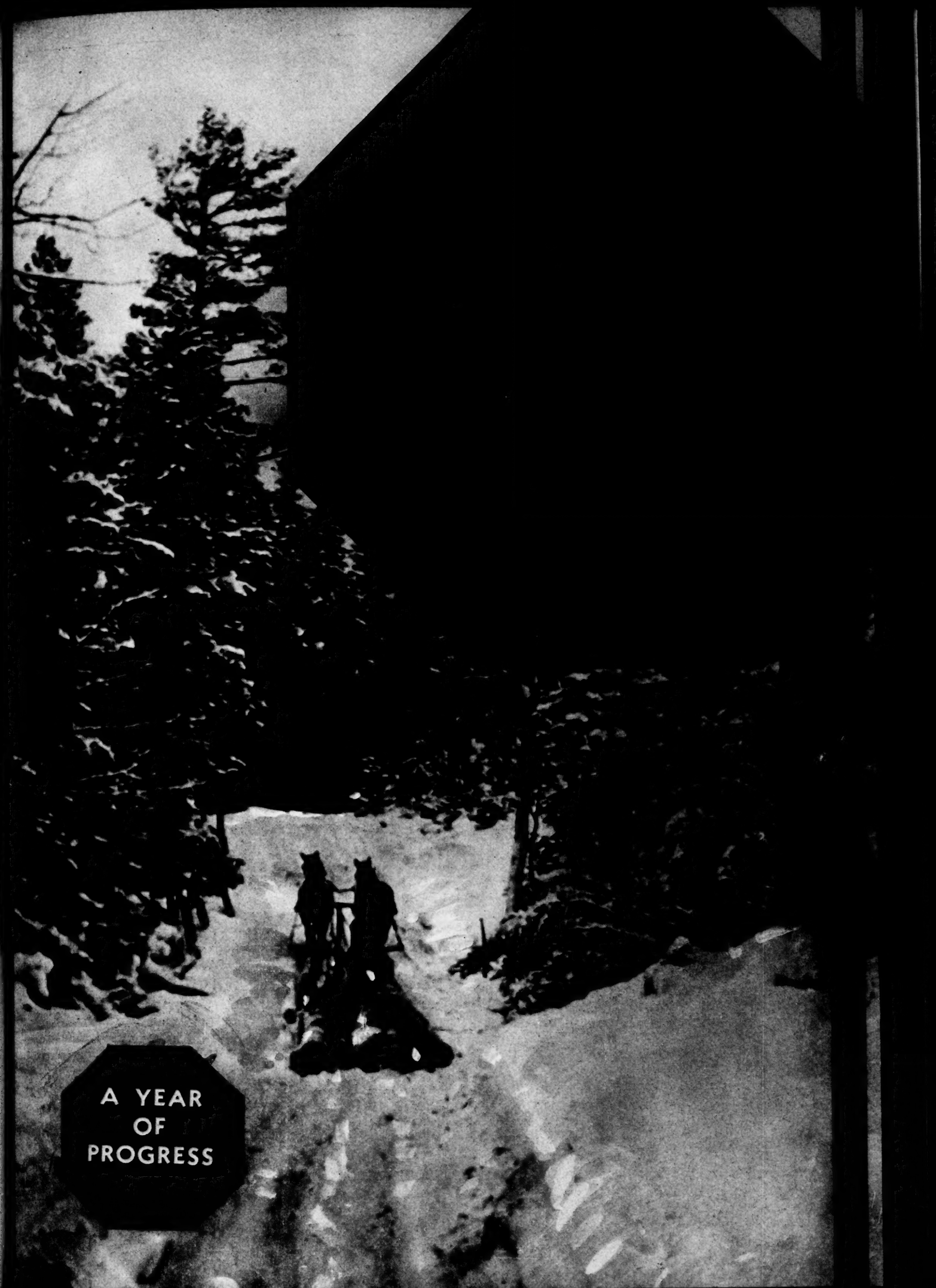
Chart 9 is a seasonally-adjusted, month-by-month curve of Automatic Heating based on number of sales of gas boilers, all types of oil burners, and class 1, 2, and 3 stokers. Compare this curve representing composite *number* of installations and Chart 7 representing a composite *value* of installations for automatic heating.

Chart 10. For some years HEATING & VENTILATING has computed this index of stock prices of firms manufacturing heating and air conditioning equipment. A few manufacture other commodities but in general this index is a fair reflection of the trend of stock prices for firms manufacturing heating, ventilating, and air conditioning equipment.

Chart 11 should not be used too literally as it is not a composite of the trend of prices of all heating equipment but only a few. It does reflect the general trend of prices up or down even though the amount of variation up or down may not be representative of all heating equipment.

Chart 12 shows the fluctuations of employment in manufacturing plants and indicates roughly the trend of employment of manufacturing plants in this industry.

Charts 13 and 14. Seasonally adjusted indexes of residential and non-residential buildings based on the total volume of building construction as reported by the F. W. Dodge Corporation for 37 eastern states. A sharp increase in residential buildings during 1936 is shown in 13 as is the increase in non-residential buildings in 14 although the apparently accidentally high figures on the latter for December, 1935, and January, 1936, are apt to mislead the eye.


A YEAR
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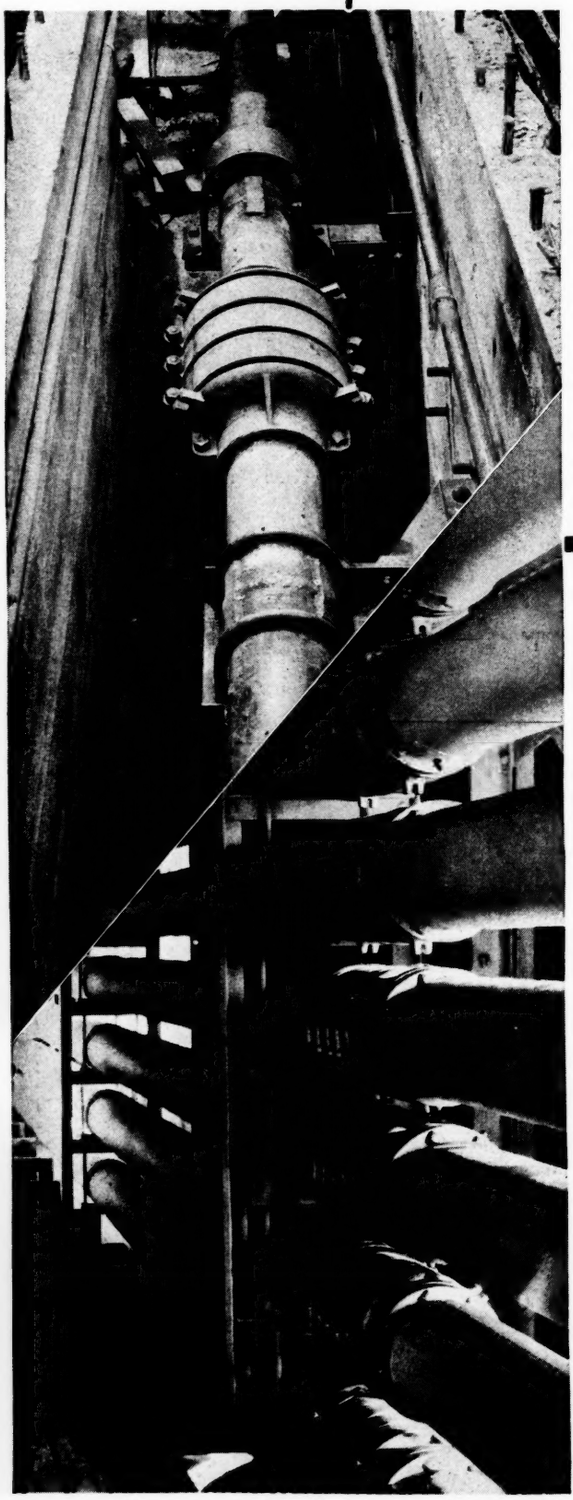

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Business and Commercial Developments

HEATING, and humidification when necessary, are the winter functions to which attention is directed in this section. Even though other processes are carried on in winter the subject matter here is confined to a review of the principal happenings of 1936 as they affect heating and humidifying. No attempt is made to be unduly critical in preserving nice distinctions between various methods. Neither does this discussion relate strictly to air conditioning as recently defined. It is believed that the readers of HEATING & VENTILATING generally have clear cut ideas about how the several processes are accomplished and do not need to have their attention called to fine distinctions except where these distinctions are really meaningful.

In this section, and also in the following sections, the method of treatment is first to describe briefly some of the principal points on which progress was made in 1936 so far as business and commercial aspects are concerned and then to pass to a statement concerning engineering and technical aspects.

Consumer Understanding

Perhaps as important a commercial point as any which can be mentioned is the improvement in user understanding which took place during 1936. Up to that time it appeared as if there was a deliberate attempt to confuse the minds of purchasers with all kinds of weird statements about just what a winter plant is supposed to do. It is believed that the year at least saw the turning point in this situation. The attitude increasingly is to be open and fair rather than mysterious and misleading. No one will deny that there is still much ground to be covered in this trend but at least a start was made. Now there is a tendency to call a humidifier by its own name, a cooler is called a cooler, and a heating plant is frequently said to be one. All this is definitely commercial progress.

During the year, too, purchasers showed an increasing tendency to demand unbiased advice in their purchases. Moreover, some progress was made in publicizing the fact that there is a definite distinction between Winter, Summer, and Year-Round air conditioning. The Federal Trade Commission issued a cease-and-desist order against a humidifier being offered for sale as an air conditioner.

Statistical Position

A good method of measuring commercial progress is to go to the statistics which show sales. The statistical method is never a true measure especially with the statistical information in a sketchy state, but statistics can be very informative. The figures presented here are as complete as possible under existing conditions and should be used with the understanding that while they show major changes and trends, they cannot be interpreted literally.

Since the low point of the depression many lines have made remarkable recoveries and some are now doing a volume of business nearly comparable to the sunny days of 1929. Most of us consciously or unconsciously use 1929 as a standard of prosperity. Few lines of business, however, are operating at better than 1929 levels so that records of equipment sales during 1936 which show larger volumes than in 1929 are spectacular indeed. Among those devices making up the list of winter equipment we find several of these, including conversion oil burning equipment, all types of convectors, and stokers. Sales figures on unit heaters were not available in 1929 but it is believed that the sales of these are now substantially over the 1929 figures.

A seven-year-old yardstick is not wholly satisfactory in gaging shipments in an industry which is undergoing so many changes as is the heating and air conditioning industry. For example, while there were very few boiler-burner units sold in 1929 and a considerable number in 1936, the great increase which has taken place has of course taken away business which otherwise might have gone to some other type of equipment; therefore, a more nearly accurate measure of progress is presented by the comparison of 1936 figures with 1935. Such comparisons are shown on pages 25 and 29, a glance at which will show that all types of equipment, with one exception, showed an increase over the preceding year. The sharpest gains were in

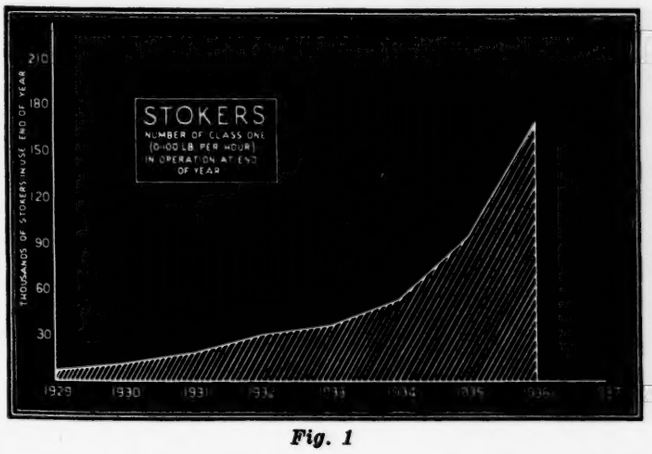


Fig. 1

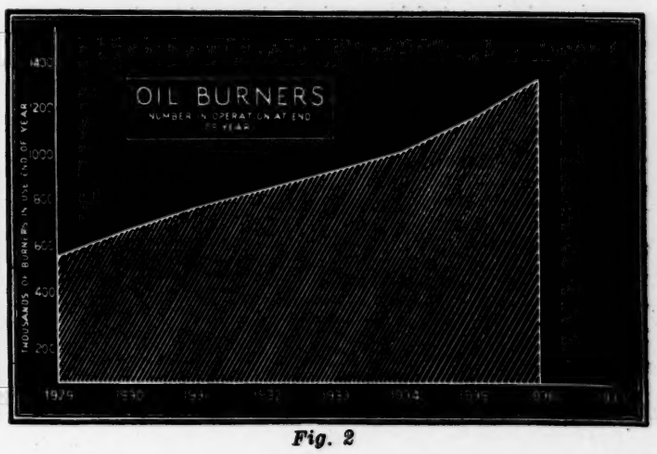


Fig. 2

cast iron convectors, oil burner-furnace units, and residential stokers.

Monthly sales figures on 17 types of winter equipment are shown on pages 23 and 27. These sales cover all of the months in 1936 for which records are available at the time of going to press, and for the 12 months of 1935†. The sales prior to 1935 can be found in the January, 1936, issue of HEATING & VENTILATING in which similar tables were presented for all of the years for which such data were available.

There is some overlapping of Tables 1W, 2W, 11W, and 14W, covering different types of boilers. Generally speaking, before the advent of the oil burner-boiler unit, cast iron boiler and radiator manufacturers made round and square cast iron boilers of the coal-fired type only. With the coming of the oil burner-boiler unit both steel boiler manufacturers and the foundry group began the manufacture of such boilers but—and this condition still exists—they did not manufacture the oil burners for their boilers. Consequently, at the present time there are many boiler-burner units being sold figures for which appear in different places. Boilers made by the old line cast iron boiler manufacturers still appear in Tables 1W and 2W and are not segregated from the coal-fired boilers. Similarly, boilers made by steel boiler manufacturers whose primary business is boiler manufacturing and who do not make oil burners, appear in Table 11W. Burners for such cast iron and steel boilers are presumably still reported as conversion burners. Boiler-burner units made by concerns which make both the boiler and the burners appear in Table 14W. This last named table, therefore, does not show a true picture of the boiler-burner business.

Table 10W is headed Industrial Type Unit Heaters, inasmuch as this definition is commonly used by different reporting agencies. It is a misleading name, however, for these unit heaters have wide applications for other than industrial purposes and perhaps a better name for them might be "commercial unit heaters." Table 17W covers unit ventilators which are also known as schoolroom type unit heaters.

Tables 18W, 19W, and 20W, covering heating stokers, are grouped arbitrarily according to the amount of coal burned per hour. The classification under Residential Stokers of all type stokers burning up to 100 lb. per hour is an artificial one which has been found unsatisfactory and will be changed by the reporting agencies during 1937, so that the residential stoker group will include those having a capacity up to 61 lb. of coal per hour, and will be subclassified to show the sales in bituminous and anthracite burners separately.

The reader may note that no tables are included on gas burning equipment. The availability for publication of these figures has not existed for some years. However, through the courtesy of the Association of Gas Appliance and Equipment Manufacturers it is possible to show the increase in sales of gas heating equipment during 1936 over 1935, based on ten months' figures. These increases are shown in the table in the next column.

†Excepting humidifiers for which figures were not available in 1935.

EQUIPMENT	INCREASE, 1936 OVER 1935, PER CENT
Gas boilers	88
Gas furnaces	131
Gas conversion burners	84

The figures on these boilers are estimated to cover 98% of the industry, those on gas furnaces 85% of the industry, and those on conversion burners 80% of the industry.

The total number of central gas heating installations made can be estimated as approximately 27,000 during 1935 and 52,000 during 1936, an increase of 93%.

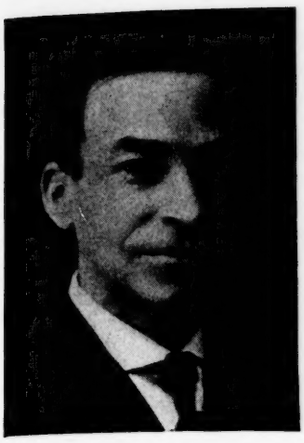
The bottom two graphs on page 27 show the number of stokers and oil burners installed by months. Two other parallel graphs are Figs. 1 and 2 (page 19), showing the number of stokers and oil burners in operation at the end of each year. It should be noted that the curve showing the number of stokers now in use applies only to the class 1 unit and does not include those burning over 100 lb. of coal per hour. It is estimated that at the end of 1936 there were approximately 169,000 residential stokers in operation and 1,333,000 oil burners in use for the heating of buildings.

Organized Radiator Heating Movement

Early in 1936, following private discussions and planning, the first public moves were made to organize a campaign to promote radiator heating in residences. Manufacturer, wholesaler, and contractor representatives drew up a program and effected a preliminary organization. The primary objectives were increased sales; unification of thought, feeling, and story; preparation of sales and publicity materials; and promotion of radiator heating as the major factor in air conditioning in residences. "Radiator Heat with Air Conditioning" became the slogan. A formal organization was formed and incorporated as the National Bureau of Heating and Air Conditioning with J. Lawrence DeNeille as president, Marshall Adams as vice-president, and Joseph C. Fitts as secretary-treasurer.

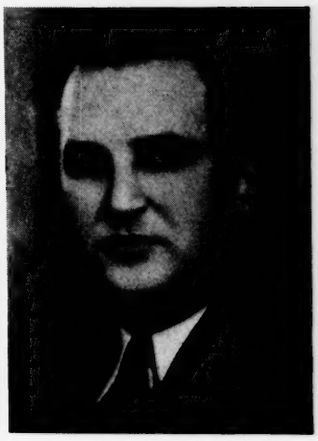
With guidance by advertising talent, booklets were prepared by late spring in which homeowners and those responsible and interested in residence planning were presented with the unified story as developed by members of the Bureau, whose principal point was that (a) winter heating is by far the most important part of air conditioning in residences; (b) steam or hot water heating is the preferable means of accomplishing this; (c) *add* humidifying, cooling, dehumidification, air cleaning, and circulation as these become profitable *after* having secured good heating through the use of radiator heating. Obviously, such a line of thought sets radiator heating up as the prime requisite and ties in with the words 'air conditioning.'

With an active organization, a plan of procedure, and printed material it was decided to try out the effectiveness of the setup. Chicago was selected for the initial effort and special meetings of contractors, wholesalers, manufacturers, and salesmen were held to acquaint them with the details of the plan. By the latter part of the summer those in charge reported that the campaign had met with great favor on the part of the

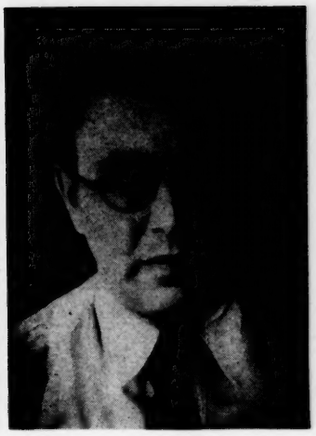


Frederick Beckbissinger, Architect, Saginaw, Mich.

H. J. Elson, Engineering Consultant, St. Louis, Mo.



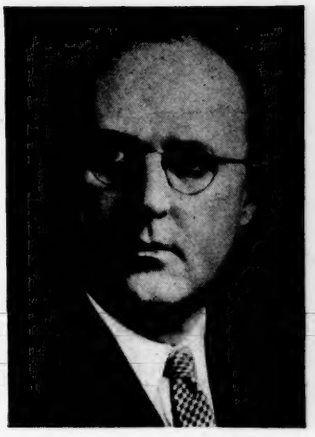
O. W. Motz, Consulting Engineer, Cincinnati, O.



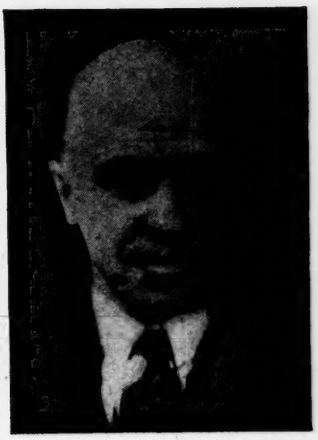
Robert E. Hattis, Consulting Engineer, Chicago, Ill.

Contributors to A Year of Progress

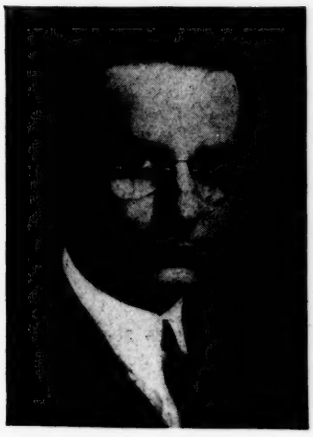
Walter E. Gillham, Consulting Engineer, Kansas City, Missouri.



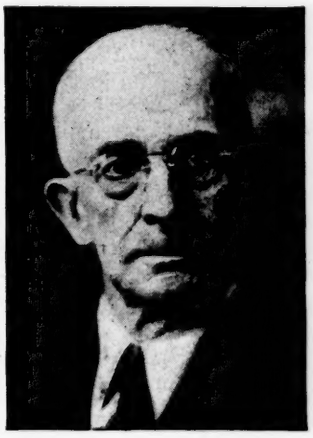
Kenneth E. Rockhold, Manager, Industrial Dept., The Careva Co., York, Penn.



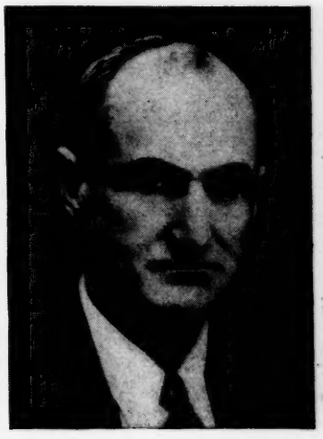
Charles W. Kimball, Mechanical Engineer, Boston, Mass.



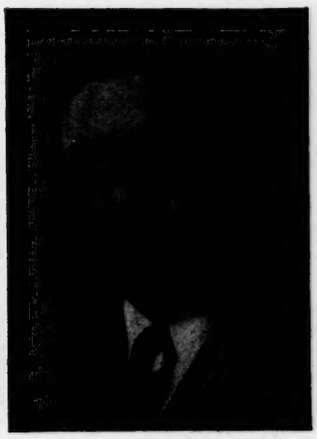
J. W. Manny, President, Chicago Oil Burner Association, Davies Supply Co., Chicago, Illinois.



H. B. Stuck, Superintendent, Steam Heating Department, The Ohio Power Company, Lima, O.



Warren Lige, Contractor-Engineer, Lige Warming and Ventilating Company, Auburn, Indiana.



Charles S. Hilton, Manager, House Heating Department, Blackstone Valley Gas and Electric Co., Pawtucket, R. I.

trade, that they were satisfied that it was sound in principle, and that it should be extended to other cities.

By early fall additional publicity in the form of printed booklets was ready for distribution, and small mailing pieces were ready for circularizing realtors, carpenter contractors, heating engineers, and building and loan associations in the Chicago area.

At the year-end the campaign plan of the Bureau had not been extended to cities other than Chicago but announced plans for 1937 indicate that it is to be extended during the coming year.

It is anticipated that the Bureau will expand its budget threefold during 1937, and that a substantial part of the sum will be devoted to establishing a research program. Cooperation between the manufacturing, distributing, and installing interests is expected to continue. Additional publicity and promotional activities are planned, and further study is expected to strengthen, clarify, and further unify the efforts of the Bureau to popularize radiator heating in residences.

It is difficult to try to evaluate the results of this movement. There seems little doubt but that it has served as a strong unifying force, that it has given point to the story told on behalf of radiator heating, and that it has served to bolster the morale of salesmen. To what extent it actually achieved its aim of promoting sales in the Chicago area is not determinable at present, nor is its long-time effect on commercial tendencies.

So far as technical thinking and engineering practices are concerned the work of the Bureau itself may have done little, but it does appear that during the year a better appreciation of the technical features of the plan advocated by the Bureau was acquired by many engineers. Some of these features are commented on elsewhere in this issue.

Radiator Heating Publicity

Work of the organization for promoting radiator heating with air conditioning for residences should not be confused with that of the Plumbing and Heating Industries Bureau, of Chicago. This bureau, supported by 40 associations and groups, continued to promote their interests through securing newspaper and magazine publicity directed at the homeowner and other consumer groups. This bureau was especially active in publicizing the standards developed by the Chicago Committee on Air Conditioning and in promoting air cooling by use of well water.

Warm Air Heating for Residences

Naturally, moves to popularize radiator heating in residences did not meet with favor on the part of those who advocate other methods. There was already a strong and unified manufacturer organization among warm air furnace and accessory makers. This association continued to push the virtues of the direct-fired warm air method. It sponsored a special national week to promote warm air. Other activities are mentioned later in this issue.

Results

The results commercially of this increasingly close rivalry between the use of direct-fired warm air systems and radiator systems for residence heating are not yet apparent. Both sides are claiming gains and both undoubtedly did improve their sales during 1936. To what extent each succeeded in neutralizing the other's tactics and campaigns cannot be evaluated. There is every reason to believe that this race for the residence business will become increasingly hot as time goes on. It is notable that most newcomers to the field and some already established are moving to fortify their position regardless of what method of heating is used in residences. They are doing this by being prepared to take on any kind of job wanted.

Fuel Situation

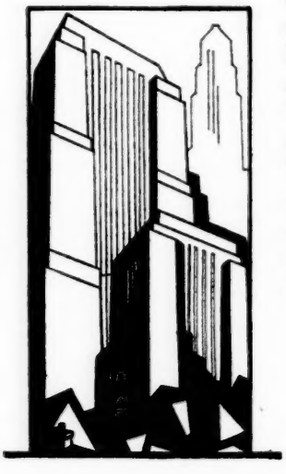
Probably the most outstanding commercial development of the year in the fuel struggle was the continued advance made by stokers. These devices came on with a rush. In factory dollars the volume of the stoker business began to approach that of the oil burner makers. In number of installations, stokers are still far behind but rising rapidly at the year-end.

A strong trade organization among the oil burner manufacturers, Oil Burner Institute, continued its program. It did much to promote harmony and to open new markets during the year as well as to assist in holding those already secured. It entered into friendly relations with the air conditioning manufacturer organization in order to assist in solving common problems.

Gas made out well commercially with more and more gas executives alive to the problem of promoting the use of gas for heating, better rate schedules, and continued cooperation between all interested parties including utilities, installers, dealers, and manufacturers.

Marketing and Distributing

The marketing problem continued to be acute throughout the year. Sales outlets are diverse and there was no sign of their anticipated contraction in number. Virtually every known plan of marketing is now in use to some extent. Well trained men are scarce. If there is to be a time when there will be a uniform marketing plan, it is still far off. The truth is that special skills are required in marketing heating and humidifying equipment and, unfortunately, the value and necessity of these skills is still not uniformly recognized.



MONTHLY EQUIPMENT SALES

WINTER AIR CONDITIONING

1936 vs. 1935

A YEAR OF PROGRESS

Table 1W—Cast Iron Square Boilers

(Shipments, 1000 Pounds)

	1935	1936
January	10,604	13,786
February	9,275	11,955
March	6,964	8,984
April	7,730	11,129
May	9,241	13,552
June	10,700	19,523
July	16,332	29,200
August	21,689	24,658
September	31,761	33,549
October	41,380	45,960
November	20,325	—
December	16,330	—
TOTAL	202,331	—

Table 2W—Cast Iron Round Boilers

(Shipments, 1000 Pounds)

	1935	1936
January	2,666	3,120
February	2,494	2,437
March	2,102	1,664
April	2,115	1,683
May	2,493	2,243
June	2,710	3,193
July	3,647	3,905
August	4,368	3,634
September	6,879	5,809
October	9,485	8,633
November	4,957	—
December	4,018	—
TOTAL	47,934	—

Table 3W—Cast Iron Radiators

(Shipments, 1000 Square Feet)

	1935	1936
January	3,117	4,183
February	2,787	3,086
March	2,023	2,720
April	2,366	3,549
May	2,835	4,175
June	3,462	5,590
July	4,675	8,027
August	6,470	7,785
September	7,701	9,190
October	10,055	12,452
November	6,616	—
December	5,413	—
TOTAL	57,520	—

Table 4W—Non-Ferrous Convectors

(Sales in Sq. Ft., Elements Only)

	1935	1936
January	80,595	145,028
February	42,529	61,682
March	48,013	62,856
April	46,182	51,085
May	49,424	74,301
June	56,280	84,395
July	81,619	100,984
August	73,768	139,583
September	58,713	105,887
October	114,171	141,406
November	112,915	—
December	60,118	—
TOTAL	824,327	—

Table 5W—Non-Ferrous Convectors, Complete

(Sales in Square Feet)

	1935	1936
January	93,407	136,021
February	66,076	121,133
March	87,225	117,400
April	106,488	202,015
May	152,944	233,101
June	147,614	348,855
July	166,807	440,717
August	243,406	414,785
September	186,531	447,562
October	230,921	459,167
November	170,231	—
December	130,212	—
TOTAL	1,781,862	—

Table 6W—Non-Ferrous Convectors

(Total Sales in Square Feet)

	1935	1936
January	174,002	281,049
February	108,605	182,815
March	135,238	180,256
April	152,670	253,100
May	202,368	307,402
June	203,894	433,250
July	248,426	541,701
August	317,174	554,368
September	245,244	553,449
October	345,092	600,573
November	283,146	—
December	190,330	—
TOTAL	2,606,189	—

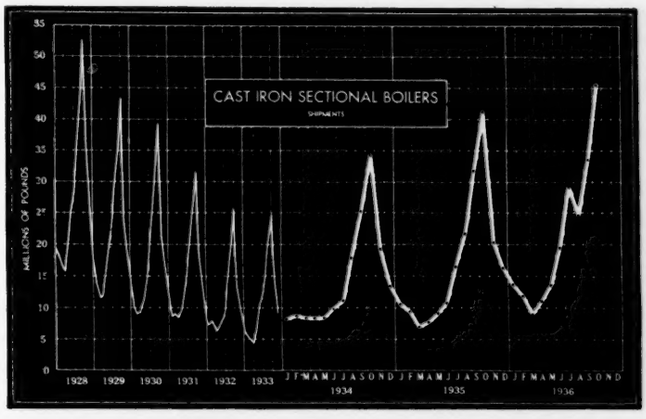


Table 7W—Cast Iron Convectors

(Sales in Square Feet)

	1935	1936
January	111,732	292,724
February	66,093	223,077
March	142,465	229,324
April	137,854	277,678
May	209,179	550,513
June	245,830	612,618
July	271,623	802,851
August	423,581	754,954
September	441,948	749,825
October	481,329	789,218
November	365,116	—
December	389,940	—
TOTAL	3,286,690	—

Table 8W—Cast Iron Convectors

(Sales in Dollars)

	1935	1936
January	$31,564	$80,338
February	20,134	66,424
March	41,569	66,007
April	42,494	84,322
May	60,430	155,386
June	73,284	172,507
July	81,861	231,595
August	116,418	229,235
September	118,040	219,557
October	134,816	244,444
November	101,505	—
December	106,534	—
TOTAL	928,649	—

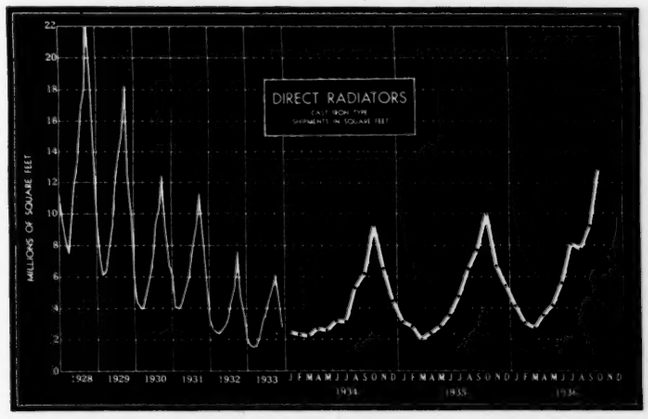

DIRECT RADIATORS
CAST IRON TYPE
SHIPMENTS IN SQUARE FEET
MILLIONS OF SQUARE FEET
1928 1929 1930 1931 1932 1933 1934 1935 1936

Table 9W—Convectors All Types

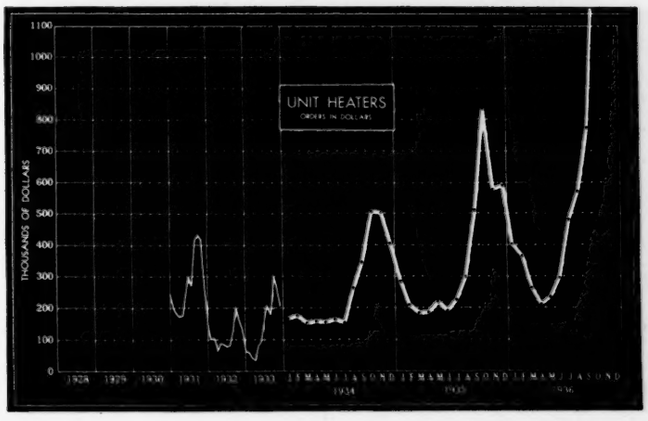
(Total Square Feet)

	1935	1936
January	285,734	573,773
February	174,698	405,892
March	277,703	409,580
April	290,524	530,778
May	411,547	857,915
June	449,724	1,045,868
July	520,049	1,344,552
August	740,755	1,309,322
September	687,192	1,303,274
October	826,421	1,389,791
November	648,262	—
December	580,270	—
TOTAL	5,892,879	—

Table 10W—Industrial Type Unit Heaters

(Sales in Dollars)

	1935	1936
January	$284,005	$402,091
February	211,057	367,197
March	180,592	263,040
April	185,869	210,881
May	218,398	232,695
June	192,731	298,643
July	226,085	480,989
August	299,586	569,605
September	510,983	773,205
October	832,571	1,359,652
November	577,003	—
December	591,612	—
TOTAL	$4,310,492	—



Technical and Engineering Aspects

BIGGEST and most attention-drawing subject in connection with steam heating during 1936 was control of this form of heating. This is nothing new for control applied to steam heating goes back over a long period. What is new is that attention is so firmly and so generally directed to the control phase as well as the novelty of some of the control means developed. There is now no single method of steam heating for which control equipment is not adapted.

This situation itself is doubtless a mark of progress. Consider that only a few years ago most 'systems' of steam heating consisted of means for securing adequate steam at the radiator and for disposing of the condensate. They were designed for peak capacity and the chief concern was to heat the building in extreme weather. So little regard was paid to means of control at off-peak periods that some of the proprietary systems did not include any provision for operating control beyond that obtained by occasional attention on the part of the attendant. Others included some means of operating control as an essential part of the installation, but frequently this means depended on periodic manual adjustments.

Recent attention has been directed toward means of not only permitting the system to follow the varying load but to secure this without attendance, or with attendance greatly reduced. In the course of this pursuit a great variety of control methods has been devised and much ingenious equipment has been marketed. Controls generally, as devised by makers of steam heating equipment, have been developed with the idea of fitting into a particular system of heating so as to form a complete and integral system with the steam specialties used. Various makers have made use of changes in pressure of steam, changes in volume, and changes in temperature to actuate secondary control devices. Interval timers, outdoor sensitive elements and indoor sensitive elements have also been used. In fact, it requires no little ingenuity to conjure up methods of control which have not been used in connection with steam heating although not all such methods have been worked out as an integral part of proprietary steam heating systems. These developments have come gradually.

However, during 1936 two methods of control for steam systems made their initial appearance and contributed to the year's progress. One of these makes use of a pressure throttling valve whose stem is positioned by the combined action of two pressure bellows. One of these bellows is connected to an inside thermostat while the other is connected to an outside thermostat made of a copper tank. In effect, therefore, the amount of steam passing through the throttling valve changes with the difference between inside and outside temperatures. Suitable adjustment permits the amount of steam admitted to change as the load changes.

The other control method operates on the relation between the temperature of condensate and the amount of steam required. In a radiator properly sized the radiator is just full of steam at the peak period of operation and the condensate comes back to the returns at its highest temperature since it has no cool surface in the radiator in which to cool off. As the outside temperature rises, the radiator is fractionally filled and the condensate temperature falls. A temperature sensitive element is located in the condensate return and actuates the valve governing the amount of steam supplied. The element in the condensate is also correlated with another temperature sensitive device located outdoors. Suitable adjustments permit the amount of steam supplied to the radiators to change as the load changes.

It is worth noting in passing that the matter of automatic control is now so generally considered as inseparable from the steam specialties that there is no major owner of a named steam heating 'system' who does not either make himself, or else furnish, automatic controls to operate as a part of his plan.

Steam Distribution in Buildings

Another part of steam heating which has received much attention is that of securing suitable steam distribution. This is often closely related to control. Steam distribution has a number of separate phases. One is the provision of means whereby steam in the desired quantity will reach the radiators or heating devices. Another is to secure suitable distribution of this quantity within the surface itself. Since the orifice can be used as a meter it is the favorite method of obtaining the distribution sought.

There is no limit to the number of places where the orifice can be placed. They are used in mains, in risers, at radiator inlets and outlets in the steam lines, at air discharges and vents, and within heating surfaces. They take on all kinds of shapes and may be fixed or adjustable. There is nothing new about the idea of using orifices to secure controlled distribution of steam.

During 1936 orifices were used in connection with indirect heating surface of the finned type to secure an even distribution of steam all along the length of each tube which goes to make up the conventional unit of such surface. This use of orifices assists in maintaining a uniform temperature over the whole area of the indirect heating surface, a condition which is frequently desired in connection with the accurate control of the temperature of air leaving a central heater.

Steam Distribution in District Heating

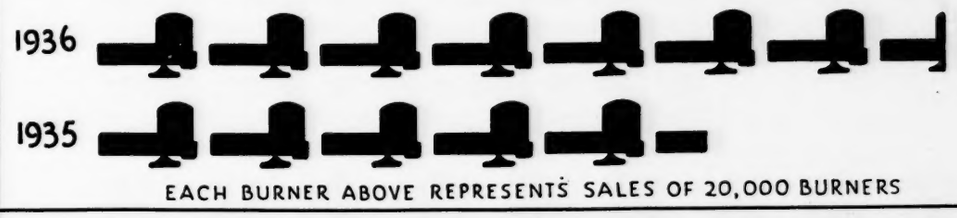
Where steam is centrally generated for a group of buildings its distribution to the building heating systems does not differ greatly from its distribution within a single building. Large pressure drop in transit, heavy insulation against heat loss, and low cost underground lines continue to be as much desired as ever. During 1936 there was but little utility construction but a large amount of PWA construction, many institutional extensions and the usual amount of replacement and extension generally. The large number of PWA housing projects and the organization of an engineering staff

EQUIPMENT SALES

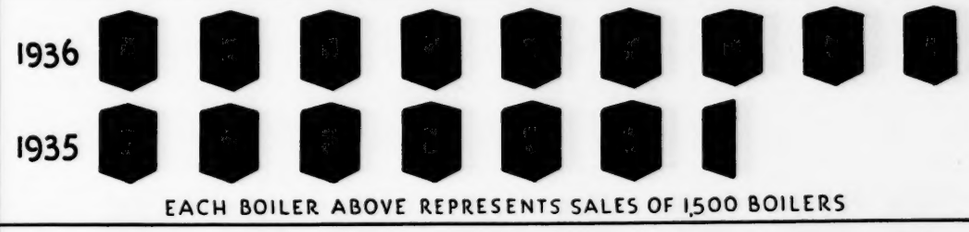
WINTER AIR CONDITIONING

1936 vs. 1935

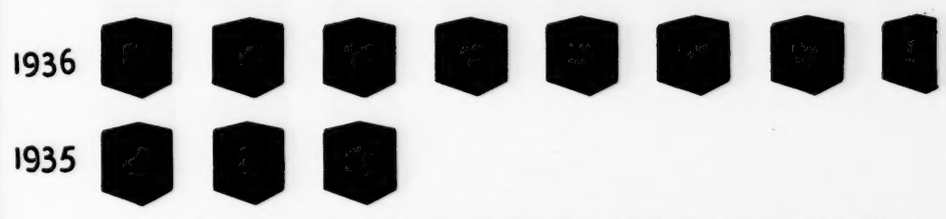
Conversion Oil Burners



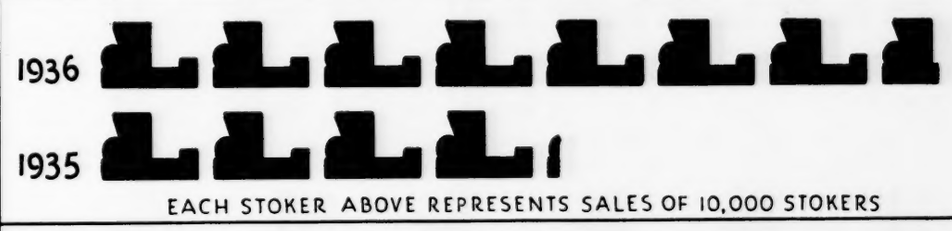
Oil Burner-Boiler Units



Oil Burner-Furnace Units

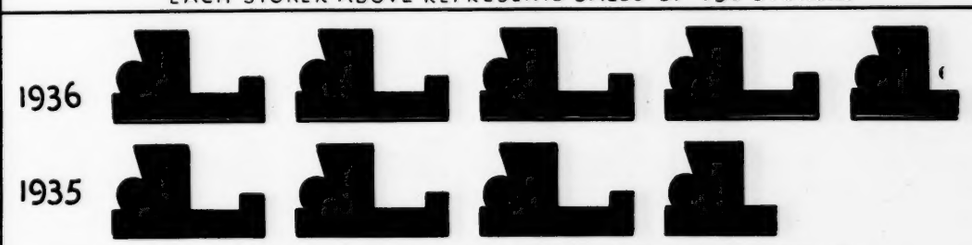


Residential Stokers

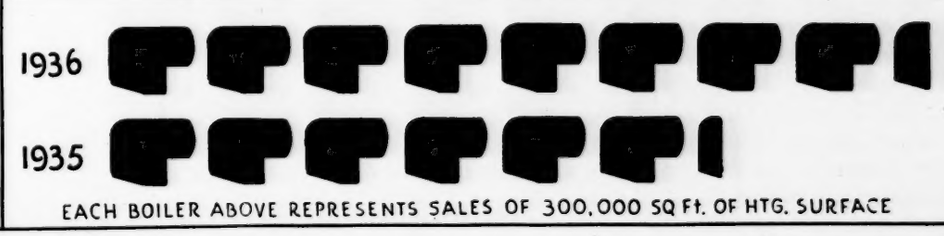


Medium Size Commercial Stokers

Large Size Commercial Stokers



Steel Heating Boilers



permitted an intensive study of steam distribution methods and equipment in connection with these building groups. The study and experience resulted in distribution methods which, while not new, can be considered as up to date. Publication of this procedure (see HEATING & VENTILATING, June, 1936, beginning page 36) made this practice available for use generally and this method can be considered as a contribution to the year's progress.

Briefly this procedure consists of generating steam at a pressure of 125 to 150 lb., reducing the pressure to approximately 30 lb. for feeding into the distribution lines, and again reducing to get a working pressure of 0 to 5 lb. for use in the buildings. Initial distribution pressure is held constant. Vacuum heating is used almost altogether. Condensation is returned to the boilers.

Heat Generation

Steam generation generally continues to follow traditional lines, not only in institutional and utility plants but in isolated plants using steam for heating. Changes have been largely in the nature of more closely accommodating boiler designs to the fuel to be used. There is less tendency toward finding means of getting oil and gas burners to operate suitably in boilers designed for coal and more tendency to furnish boilers designed for the particular fuel. This has naturally had its most notable and striking development in connection with boilers for use in residences.

There are several developments in this connection. One idea of suiting the boiler to the fuel goes all the way and fits the boiler and combustion chamber to a particular burner. This logically leads to the integral boiler-burner unit. Another idea is to design the boiler for the fuel characteristics and to vary the combustion chamber details to fit any number of burners. This leads to the assembled boiler-burner unit in which the usual conversion type of burning device is used.

It cannot be stated that any of these methods of steam generation were new during 1936 but it is notable that following a period when a great many equipment manufacturers brought out integrally designed boiler-burner units apparently with the expectation that this idea might be widely accepted, sales results for 1936 do not show that the conversion burner has lost its relative position of popularity. Progress during the year is if anything on the side of the conversion burner.

This same situation in domestic heat generating equipment applies to hot water heating systems and to direct-fired warm air. The idea of placing a rather standardized conversion burner into a boiler, heater, or furnace designed for the fuel rather than for the particular burner is firmly established and the year saw it become more popular rather than less popular.

Early in 1936 The Steel Heating Boiler Institute published a revised rating code. This code includes tables which list the standard rating both hand-fired and stoker-fired. The same pamphlet contains a list of standard specifications, and outlines a method of steel boiler selection as well as a chart showing standard furnace heights for bituminous stoker firing. Appearance of these standards is in the direction of simplification and the standard ratings were developed in cooperation with the Bureau of Standards as Simplified Practice Recommendation R157-35. Even with these standards in existence the practice of specification writers calling for their own off-standard designs and sizes has not stopped. Progress in this respect is slow and suggestions have been made that all boiler manufacturers should stand together and decline to submit quotations on anything except boilers meeting the code standards. At the year-end there was no indication as to how effectively such suggestions met the situation.

Oil Burning

Most of the technical problems in connection with the burning of oil have been removed to the extent that it can be safely stated that 1936 saw no outstanding technical advances. Not only are the technical problems well in hand but the knowledge is now so generally held that problems of technique are largely concerned with finding the best manufacturing methods. To survive, a burner must now be produced cheaply at the factory, be readily installed and serviced. Technical improvements are in the nature of designing to meet those requirements. Emphasis is placed on such items as: accessibility of parts; ready break-down of connections; appearance, including color and the inevitable streamlining. Engineering design is regarded as an accomplished fact while attention is turned to commercial and merchandising design. There is every reason to believe that this tendency will continue as oil burning equipment becomes more and more standardized in combustion performance. Emphasis is also on low price in order to expand oil burner sales into lower and lower income groups and this pressure militates against anything more than fair performance. There will be little tendency toward development along any but economical lines unless and until the equipment market eventually falls into the hands of a few manufacturing and selling specialists or comes under the control of the oil refiners.

Oil equipment for use under steam raising boilers in buildings other than residences has been greatly affected by the small burners. There is less emphasis on automatic features and the oil used is of the cheaper grades. No engineering progress during the year is especially singled out for mention.

Gas Burning

Gas burning methods and equipment are also now well developed. The problems are much more those of marketing and of securing gas rates which will permit competition rather than those of securing suitable burner designs or well-performing installations. Here also the conversion burner has maintained its position of popularity. During the year information based on the extensive experience of the Chicago utility with the installation and service of conversion gas burners was made available. Progress was in the form of gradual developments and refinements in equipment rather than in anything revolutionary or spectacular.

Coal Burning

Stoker feeding of coal to boilers and furnaces has been largely responsible for the recent changes in technique. It is only necessary to refer to the statistical

MONTHLY EQUIPMENT SALES

WINTER AIR CONDITIONING

1936 vs. 1935

A YEAR OF PROGRESS

Table 11W—Steel Heating Boilers

(Sales in Number of Boilers)

	1935	1936
January	190	444
February	163	453
March	191	347
April	296	373
May	803	416
June	323	639
July	355	757
August	535	779
September	617	912
October	534	843
November	377	—
December	369	—
TOTAL	4,753	—

Table 12W—Steel Heating Boilers

(Sales in Square Feet of Surface)

	1935	1936
January	63,385	214,719
February	55,611	209,172
March	75,171	156,130
April	106,485	162,279
May	356,648	182,593
June	146,547	312,718
July	146,931	343,595
August	221,525	307,940
September	216,720	301,880
October	191,442	284,766
November	107,140	—
December	183,076	—
TOTAL	1,870,681	—

Table 13W—Conversion Oil Burners

(U. S. Sales, Mechanical Draft)

	1935	1936
January	3,089	5,248
February	3,145	5,278
March	4,130	6,701
April	6,589	7,641
May	7,507	9,727
June	7,783	11,185
July	7,608	13,952
August	12,493	17,138
September	23,175	29,492
October	21,209	27,878
November	7,465	—
December	5,613	—
TOTAL	109,806	—

Table 14W—Oil Burner-Boiler Units

(U.S. Sales, Number of Units)

	1935	1936
January	272	411
February	231	359
March	361	514
April	613	589
May	974	776
June	837	1,411
July	744	1,230
August	1,143	1,556
September	1,559	2,332
October	1,816	2,298
November	804	—
December	450	—
TOTAL	9,804	—

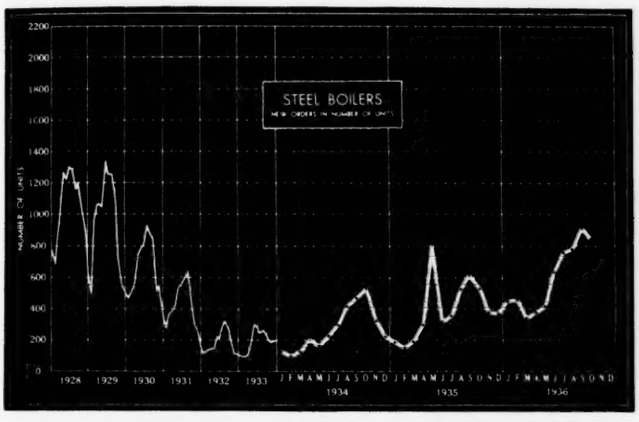


Table 15W—Oil Burner-Furnace Units

(U.S. Sales, Number of Units)

	1935	1936
January	45	220
February	40	230
March	53	219
April	96	340
May	135	282
June	137	541
July	197	556
August	333	774
September	594	1,027
October	706	1,130
November	399	—
December	277	—
TOTAL	3,012	—

Table 16W—Humidifying Equipment

(Sales in Dollars)

	1935	1936
January	—	$ 83,192
February	—	79,401
March	—	43,401
April	—	57,016
May	—	65,395
June	—	82,323
July	—	101,552
August	—	73,921
September	—	83,506
October	—	125,087
November	—	—
December	—	—
TOTAL	—	—

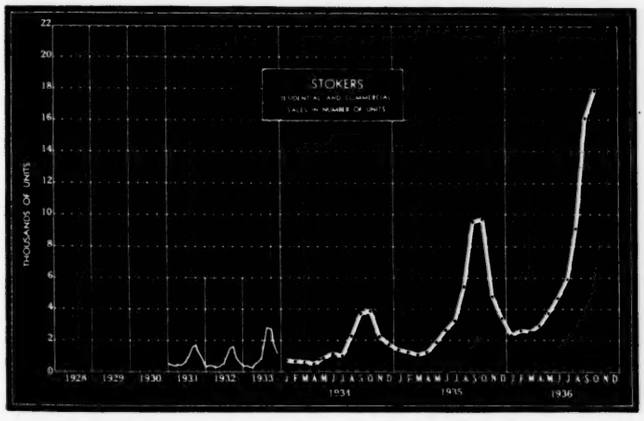


Table 17W—Unit Ventilators

(Sales in Dollars)

	1935	1936
January	$158,417	$202,503
February	67,521	216,401
March	109,051	130,570
April	138,362	190,302
May	118,440	196,048
June	187,129	168,572
July	112,356	123,926
August	132,012	133,389
September	99,415	62,645
October	69,357	96,381
November	101,904	—
December	441,336	—
TOTAL	$1,735,300	—

Table 18W—Residential Stokers

(Sales, Units up to 100 lb. per hr.)

	1935	1936
January	1,241	2,065
February	1,113	2,342
March	956	2,376
April	1,046	2,745
May	1,706	3,547
June	2,432	4,381
July	2,872	5,488
August	4,931	8,433
September	8,687	15,040
October	8,777	16,540
November	4,287	—
December	3,078	—
TOTAL	41,126	—

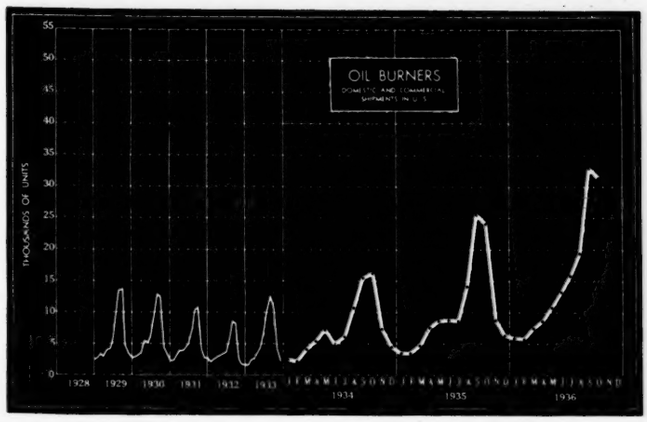


Table 19W—Small Commercial Stokers

(Sales, Units 100-200 lb. per hr.)

	1935	1936
January	147	187
February	107	167
March	84	130
April	83	130
May	107	123
June	158	199
July	190	316
August	348	492
September	615	805
October	683	1,016
November	359	—
December	281	—
TOTAL	3,162	—

Table 20W—Large Commercial Stokers

(Sales, Units 200-300 lb. per hr.)

	1935	1936
January	61	84
February	48	71
March	37	40
April	33	44
May	41	60
June	55	76
July	96	148
August	164	198
September	272	268
October	268	302
November	145	—
December	108	—
TOTAL	1,328	—

records on earlier pages to note that the sales record for 1936 reached a new all-time peak and that the sales of stokers are increasing more rapidly than any other type of combustion equipment.

Behind the sales record lay a peak expenditure of time, effort, and funds devoted to engineering research. The stoker is an up-and-coming device. It has only begun to feel the benefits possible with quantity production, for 1936 was the first year when manufacturing was really able to use quantity methods. By the year-end it was evident that the research put into small stokers was paying in the form of accomplishments and by opening up promising lines of attack not yet fully developed. Unlike the oil burner and the gas burner the stoker is still frankly open to engineering study rather than to refinements in equipment details only.

Aside from the truly outstanding gain in sales volume perhaps the most interesting point in connection with stokers during 1936 was the increased tendency toward fully automatic operation. Bin-feed received concentrated attention. In the case of underfeed stokers much more development work has been done recently on bin-feed stokers than on those which use a hopper. Leaders are convinced that bin-feed is the coming thing, and point to the public response which this feature received in 1936.

Early bin-feed stokers were relatively expensive. Development work on this feature has centered about simplification in design and economy in purchase price. Models which reached the market in 1936 required no special construction in order to secure the bin-feed feature. There is now much choice possible in the location of drive and fan units and they may be located where they are accessible but not in the way of free movement about the furnace or boiler.

With hopper models, emphasis has lately been placed on quieter operation and improved appearance. Sound absorbing materials have been used extensively in the drive mechanism housings. Especial attention has been given to designing fans for quiet operation.

Control of the air supplied has received increasing thought, and designs for such controls have been worked out to give automatic regulation. These devices regulate the air quantity in relation to changes in coal feed and to resistance to air passage through the fuel bed.

Improved material selection is also apparent. Alloy sheets to resist abrasion of the coal are used by some makers in the feeding worms of underfeed stokers. Attention to securing the necessary rigidity and strength in all parts is now conceded as necessary.

One manufacturer introduced an air-spreading feed mechanism which operates on the overhead feed principle. It feeds steam size coal into the furnace on a stream of air in much the same fashion as a pulverized coal burner. Such a method is adapted to firing some heavy caking coals.

During 1936 several stoker manufacturers cooperated closely with furnace, boiler, and residential air conditioning manufacturers. Their collaboration resulted in the introduction of stoker-boiler and stoker-furnace units intended to produce the maximum efficiencies with burner and heat absorbing surfaces designed to suit each other's characteristics.

Generally the leading stoker manufacturers are committed to good engineering as a definite policy. They realize the problems as being of a complex nature and that the stoker designer must know his coal, be a combustion engineer, and know the firing and load characteristics which stokers must meet. They also recognize that quantity production is a means of giving greater value to customers. While quantity production has come only recently, it has brought welded construction already, and permitted the use of press and die work, as well as an improved grade of machine work on gear cases. Now gear cases are being used having gears equal in design and workmanship to automotive gears.

On the whole 1936 was a year which saw engineering staffs of the leading manufacturers make much progress both in designs of their 1936 products and in developments looking toward further improvements in 1937.

Stoker Fuel

Appearance of stokers brought about much discussion regarding coal characteristics for use with these devices. As yet the problem is not fully worked out but most coal producers are aware of the requirements. Some have moved to meet them. Progress has been made in that coals especially prepared for stoker use are now on the market. Whether the coal requirements can be systematized fully and reduced to a few standards remains to be seen.

Research on the subject of stoker fuels has been inaugurated and during 1936 reports appeared from work done at Battelle Memorial Institute. At the year-end this work was still being actively pursued.

Heaters and Heating Surface

Unit heaters using fan propulsion of air first found applications in factories and similar buildings. Recent trends have been in the direction of making these heaters more suitable for use in other places. Casings have been beautified in form and color for location within offices and living quarters. Special attention has been given to sound control especially by streamlining air passageways, by improved motor mountings, and by reduced air velocities. These trends continued throughout 1936. Heaters carrying motor-driven fans for air distribution and for location inside living rooms have now reached such a point of development that they receive active consideration as a heating device not only in factories but wherever there is to be a heating device.

In factory heating with unit heaters attention continues to be directed to the flexibility in location of the heated air stream which can be obtained with these heaters. This flexibility is especially desirable where there is a demand for spot heating. A recent development was a factory type unit heater equipped with oil burner and fuel tank all mounted on a frame and which can be moved from place to place as a complete unit and having an air outlet close to the floor for sweeping a stream of air over stock piled on the floor.

Room radiators using gravity circulation of air have been progressively reduced in size and improved in

EQUIPMENT SALES

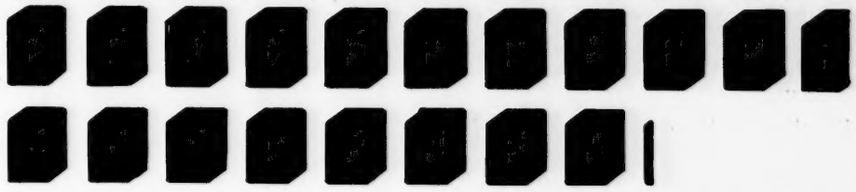
WINTER AIR CONDITIONING

1936 vs. 1935

Cast Iron Round Boilers

EACH BOILER ABOVE REPRESENTS SALES OF 5,000,000 lb.

Cast Iron Square Boilers

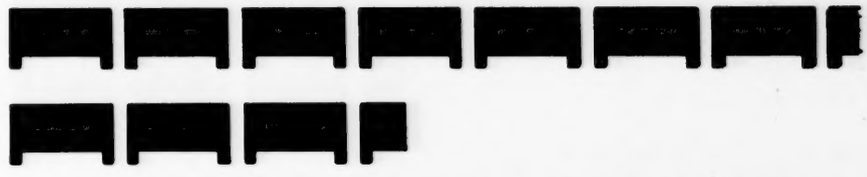


EACH BOILER ABOVE REPRESENTS SALES OF 25,000,000 lb.

Cast Iron Radiators

EACH RADIATOR ABOVE REPRESENTS SALES OF 10,000,000 SQ Ft.

Cast Iron Convectors

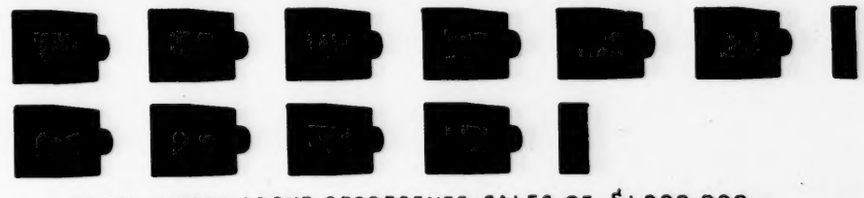


EACH CONVECTOR ABOVE REPRESENTS SALES OF 1,000,000 SQ. Ft.

Non-Ferrous Convectors

EACH CONVECTOR ABOVE REPRESENTS SALES OF 1,000,000 SQ. Ft.

Unit Heaters



EACH HEATER ABOVE REPRESENTS SALES OF $1,000,000

Unit Ventilators

EACH VENTILATOR ABOVE REPRESENTS SALES OF $250,000

appearance. This tendency continued in 1936. Certain manufacturers of cast iron direct radiators brought out designs which showed advances in the ability of their foundries to produce good heat transfer surface. As a result these radiators are smaller and lighter in weight per square foot of heating surface than ever before. Installation of room radiators in wall recesses and in metal enclosures continued to be popular, especially in residence work. Special designs developed for enclosing and which are really convectors continued, a few new products were brought out but in general the designs announced in former years were continued during 1936. Mention has already been made of certain improvements in steam distribution in indirect heating surface.

Residential Warm Air Heating

In plants where heat is obtained from direct-fired, warm air equipment, the big application development of the year was the attention given to simplifying the method of sizing ducts where there is a fan for producing air flow. Duct and register sizing for gravity warm air installations has been well standardized for some time and reduced to a code for simple application. Fans for these plants are comparatively new and ever since they began to appear there has been difference of opinion regarding what should be done about securing suitable duct and register sizes.

General opinion was that ducts and registers should be sized individually for each installation and that the design of ducts must proceed along the lines usually followed where a central fan and duct system is installed in a large building. This means a calculation of duct and equipment friction and frequently calls for size manipulation in order to equalize pressures. Generally, it meant more calculation than lots of people thought desirable.

It has always been evident that an alternate method is to use a relatively large trunk duct and to adjust air volume from branch lines by using dampers. The arguments in favor of this procedure are simplicity of layout with little or no calculation and the possibility of using standard size prefabricated ducts which can be built by factory methods. Some members of the industry have long advocated and used this method. Perhaps the most notable development of 1936 in warm air heating practice was a general tendency toward adoption of this point of view. General acceptance of this attitude toward duct sizing would mean another step toward making the layout of warm air plants in residences purely a matter of applying simple rules. It would also mean the greatly increased use of standardized ducts and it would appear that such a demand could be built up for a few sizes that factory production methods would be amply justified. Any general move in this direction would also eliminate local fabrication of ducts in the shops of independent metal contractors.

It is also worthy of note in this same connection that quantity production of direct-fired winter warm air conditioning units only really got under way in 1936. Consequently, it is too early to predict just what the combination of quantity-produced standardized ducts together with equally standardized and quantity-produced furnaces may eventually do to the residential heating picture.

The research work on residential warm air heating at the University of Illinois continued throughout the year, thus marking the twentieth year that this project has continued under the sponsorship of National Warm Air Heating and Air Conditioning Association. Results of this study were reported to meetings of the Association in papers by Professors Kratz, Fahnestock, and Konzo. Abstracts of these papers appeared in HEATING & VENTILATING in the March and July issues.

Research results have been codified and thus made directly useful to the industry by an association committee of which Prof. J. D. Hoffman is chairman. This committee prepared the code so widely used in sizing gravity systems. During 1936 work was continued on a similar code for mechanical circulation systems. It was submitted to the Association in December and it is expected that the code will be ready for distribution early in 1937.

Residential Package Merchandise

One of the ideas which has been much discussed, much tried and often abandoned is to reduce residential heating and cooling to a completely standardized basis. The thought behind these attempts is usually twofold. One angle is that such a method of approach would probably permit maximum economy in first cost to the homeowner because field installation could be cut to a minimum and could be done by any available labor. The second is that sale of a "package" with all parts included would permit the seller to get the greatest possible amount of his own equipment into the job and would let him have full control and, at the same time, full responsibility.

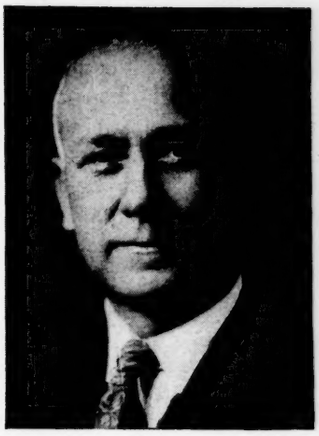
Many an approach has been made to this problem. Some of them have been described in HEATING & VENTILATING from time to time. During 1936 one manufacturer approached the problem in a rather unusual way.

He had the following separate products of his own manufacture to put into the package: (1) a kitchen refrigerator, (2) an electric range (or a gas range, if desired), (3) a steam boiler with choice of oil or gas as fuel, (4) a basement conditioner unit, (5) a refrigeration compressor and condenser unit (basement), (6) operating dampers and controls. With these he started out to design a house which would permit making use of all these as a standard package.

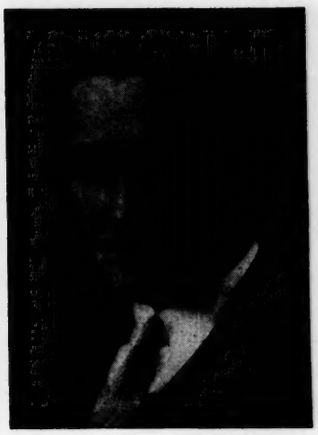
To use the package without variation in all kinds of houses no matter where located, how large or how constructed is manifestly not good practice. To get around this point the idea was to standardize on a floor plan and on construction materials and methods which affect the summer or winter heat loads. This plan permits minor changes in materials and methods and gives considerable leeway in arrangement of rooms and in choices of details of interior and exterior treatment. The plans made public show six rooms and bath, two-story and basement of the conventional cubical box layout with three rooms on the first floor and three on the second. It is stated by the promoting manufacturer that houses following this plan and using these specifica-

Harry N. Wells, Contracting Engineer, Walter E. Bittner, Trenton, N. J.

Alfred Kellogg, Consulting Engineer, Boston, Massachusetts.

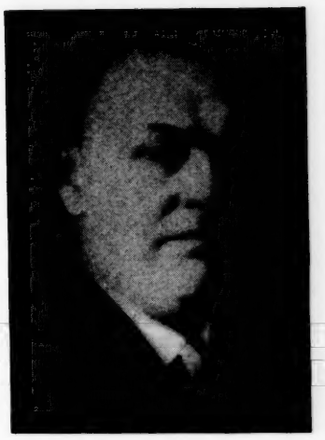


Charles Foster, Consulting Engineer, Foster & Wahlberg, Duluth, Minn.

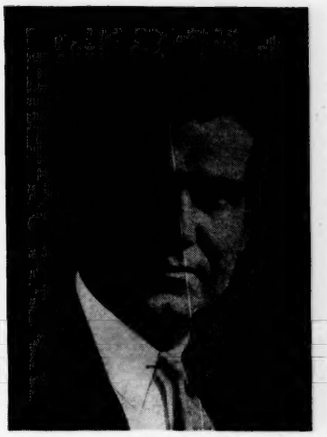


Charles S. Leopold, Consulting Engineer, Philadelphia, Pennsylvania.

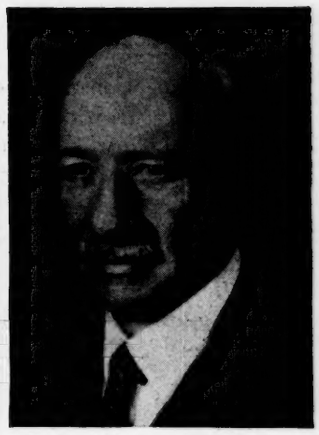
Contributors to A Year of Progress



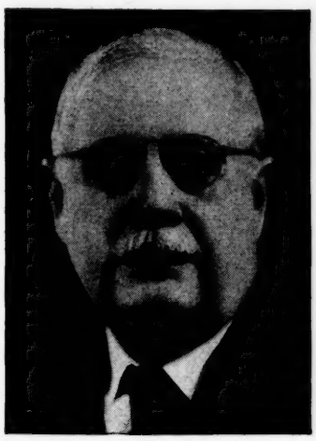
J. F. G. Miller, President, Air Conditioning Manufacturers' Association, B. F. Sturtevant Co., Boston, Mass.



Neil D. Skinner, Chairman, Committee to Study Well Water Cooling for Homes, Crane Co., Chicago, Ill.



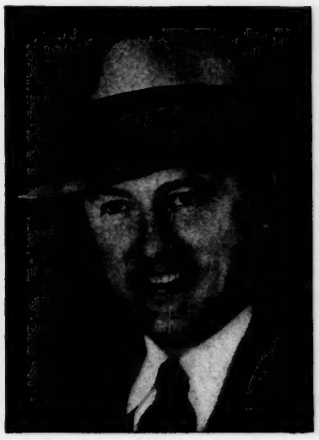
P. A. L. Foulds, Consulting Engineer, Associated with the Office of Hollis French, Boston, Mass.



Michael E. Miller, Designing and Surveying Engineer, Omaha, Neb.

Clyde E. Williams, Director, Battelle Memorial Institute, Columbus, O.

F. C. Houghten, Director, Research Laboratory, ASHVE, Pittsburgh, Pa.



Franklin H. Morgan, Engineer, The R. C. Mahon Co., Detroit, Mich.

tions can be built for about $7,000 including the package of equipment but excluding land and garage.

The effect of the method is to fix the cubical contents of the house and the location and size of ducts and the location of the several items of equipment included in the package. Thus a standard material list can be prepared. A number of these houses are reported either built or in process of construction in various parts of the country. Operating results from these installations are not available.

Standard Names for Winter Systems

During 1936 the distinction between the functions to be regarded as belonging to winter air conditioning and those belonging to summer air conditioning were clarified to a considerable extent in the minds of consumers as well as those of engineers. Some of this progress was no doubt due to the effects of advertising and sales pressure by manufacturer and distributor selling organizations, some was due to the adoption and publicizing of definitions by the Federal Trade Commission and Better Business Bureau. Besides these efforts, there was no doubt a natural tendency for the whole subject to be better understood as the purchaser and his technical representative continued to examine things closely in order to know where they stood.

To those who are familiar with the whole situation from long contact, no innovation in thought is necessary to a conception which separates the summer functions from those in winter. Such a separation is entirely natural to people who approach the subject of air conditioning from the equipment standpoint. They understand well that the summer functions can be accomplished by equipment which need have no physical connection whatever with that used in winter, and vice versa. Thus year-round conditioning can be accomplished by operating two entirely separate plants at different times or by operating parts of the same plant throughout the year and other parts during certain seasons only. Moreover, there are various ways of accomplishing each function. Put all these possibilities together and arrange them in groups and it will be found that the number of possible combinations is almost limitless. This great number of possible combinations is one of the reasons so many people have had difficulty in keeping their thinking straight in the face of so much confusion.

It has been true for some years that periodically some group develops equipment to fit some combination of the possibilities and then moves actively to popularize it. During 1936 this occurred in connection with the winter functions especially. The particular move was to advocate the separation of heating from all other functions, to emphasize its importance and urge that adequate heating be provided regardless of whether other functions were taken care of or not. A plan for this was advanced.

In Fig. 3 the elements of this plan are shown. It will be noted that it provides for direct radiators in each room and that heat is carried to them by either steam or hot water, thus giving a conventional steam or hot water heating system. In addition, there is a central device containing a fan, filter, and a humidifier. Space is provided in it for a coil or coils which may be used to heat or cool the air passing through. This device may be either separate from the boiler or constructed within the boiler casing.

In the minimum installation the plan would call for radiators in each room with as simple a piping arrangement as possible; a fan, filter, and humidifier in the cabinet with a supply and return duct to some central room. With suitable installation and control, this arrangement permits accomplishing all the functions of winter air conditioning. It is "split" in the sense that each of the four winter functions can be accomplished entirely separate from any of the others, if desired. Also the fan can be operated in summer when desirable, thus giving some movement of air together with filtering action.

Above this minimum any additional functions can be added as or when wanted and as many refinements as wanted can be worked out. Thus there can be ducts to and from as many rooms as desired, connections to outside air, provision for refrigeration, automatic control.

This plan is commonly being described as a "split" system and it will be noted that it does definitely split

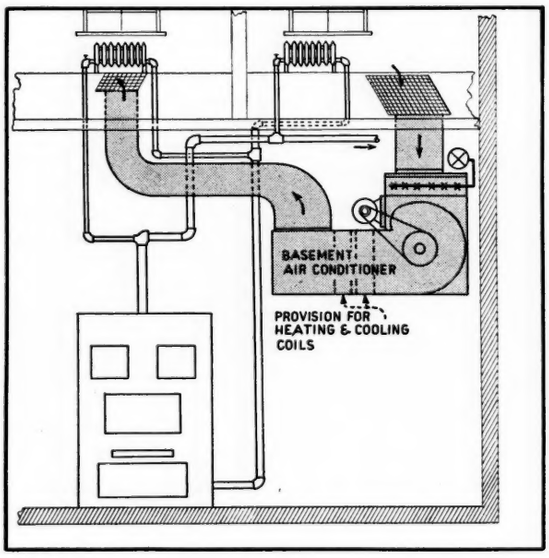


Fig. 3

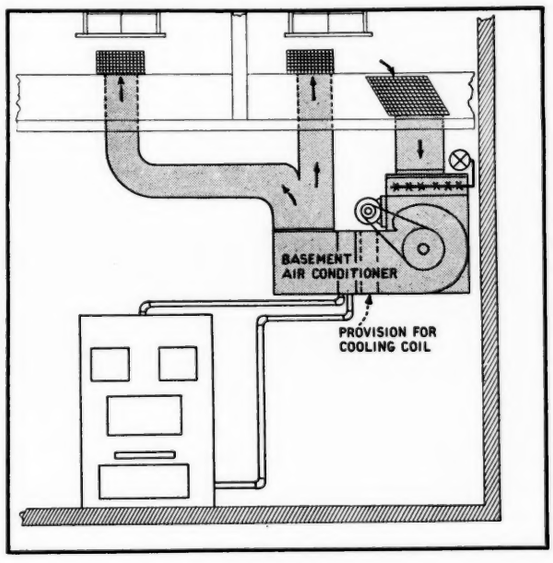
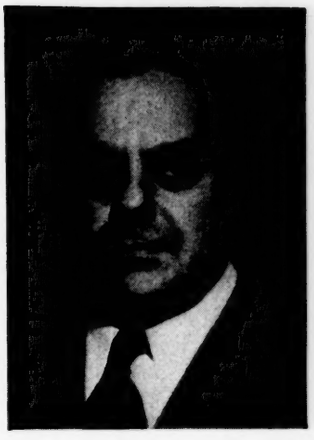


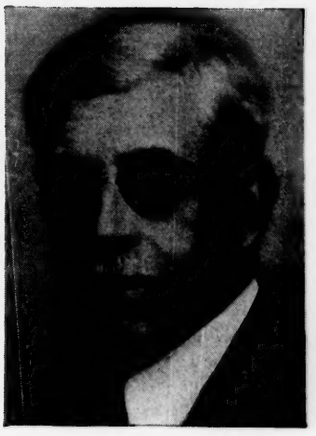
Fig. 4

William H. Sanford, Secretary-Treasurer, National District Heating Association, Philadelphia, Pa.

A. G. Dixon, President, Industrial Unit Heater Association, Modine Manufacturing Company, Racine, Wis.

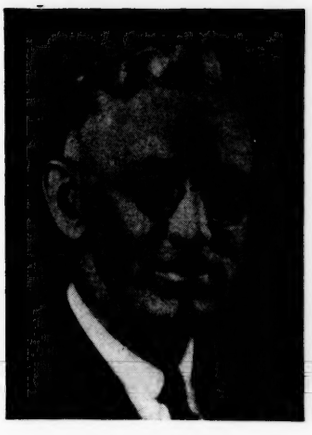


C. J. Bassler, President, Chicago Air Conditioning Association, Air Conditioning Corp., Chicago, Ill.



L. S. Morse, President, American Society of Refrigerating Engineers, York Ice Machinery Corp., York, Pa.

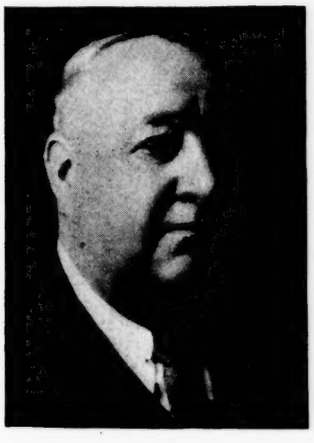
A YEAR OF PROGRESS



Charles A. Hamilton, Consulting Engineer, Hamilton & Weeber, Grand Rapids.

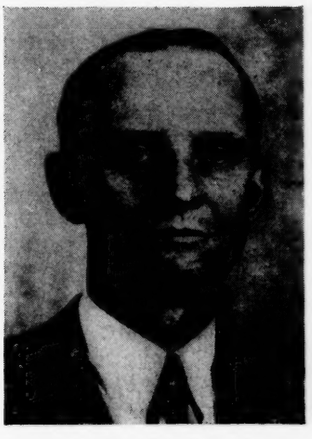
F. W. Rabe, Texas Bureau of Air Conditioning and Standardization, Dallas, Tex.

Raymond C. Broach, Industrial Engineer, Georgia Natural Gas Corp., Atlanta.



Harry E. Mayo, President, Boston Oil Burner Associates, Boston, Mass.

G. L. Larson, President, ASHVE, University of Wisconsin, Madison, Wis.



George Wehrle, Sup't., Gas Dep't, The Public Service Co. of Colorado, Denver.

Frank W. Earnest, Jr., President, Anthracite Industries, Inc., New York.

the heating from all other functions for the heating is entirely independent of fan action while the other functions require that the fan operate.

There is another plan rather similar to this one and which is also being currently described as a "split" system. It is shown diagrammatically in Fig. 4, page 32. Note that there are no room radiators. It is strictly a central air-heating and air-cooling plant. Circulation of the air—and therefore fan operation—is necessary in order to get any heating or cooling effect in the rooms. There are ducts leading to and from each room to the central conditioning device which in appearance is like the one shown in Fig. 3 and contains a fan, filter, and humidifier. In addition it contains coil surface to heat air enough to supply all the rooms. As in Fig. 3 the conditioner may be separate from the boiler or it may be constructed within the boiler casing.

In the minimum installation with this plan there must be a boiler for supplying steam or hot water to the coil in the conditioner, and the conditioner must have a heating coil, fan, filter, and humidifier in order to perform all the functions of winter air conditioning.

Above the minimum any additional functions can be added to this system as and when wanted, just as with the plan shown in Fig. 3. Thus there can be connections to outside air, provision for refrigeration, automatic control.

Now it is interesting to note that the word "split" applied to this plan means something entirely different from what it means applied to the plan of Fig. 3. There the heating was entirely split off from and independent of the operation of the fan, the other functions depended on fan operation. In Fig. 4 there must be fan operation in order to get any effect at all from the installation. If anything is "split" in this plant it is the means of adding heat; that is, the fire is remote or "indirect" in the wording commonly used in describing heating systems. It would seem much more reasonable to call this plan by some name other than "split."

Another set of facts also complicates things. It is evident that the plans shown in Figs. 3 and 4 can be combined with each other in an unlimited number of ways. In a given building certain rooms may use one plan at the same time that the other plan is being used in another part of the building. Here there is still more trouble in attempting to keep names and ideas straight. The result is that confusion is added to confusion.

All this confusion does not detract from the progress actually made in 1936 in setting up meaningful distinctions to assist users in knowing more about the functions of air conditioning. It simply means that in spite of this progress there is still much to be done in coming months and years. It appears that the worst confusion in respect to functions and names to be used is now found in connection with winter plants. Here is a situation where a little standardization is badly needed and certain to come if not formally then by a gradual informal action.

Hot Water Heating Methods

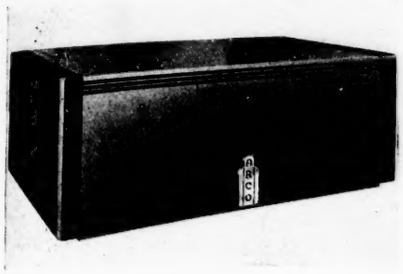
Progress in the application of hot water heating systems during 1936 was largely foreshadowed in preceding years. Ever since the appearance of means for keeping a steady supply of hot water in the boiler and releasing it to the radiators on demand, this method of building heating has definitely been on the increase. The past year was marked more by efforts to extend acceptance of the idea of sizing radiators on the same basis as for steam systems and to extend the use of mechanical means for circulating the water than to any specific development of an engineering or technical nature. Refinements in design and manufacture of equipment were the goal rather than the development of strictly new equipment. Great interest was displayed in methods for using hot water heating with a split system of winter air conditioning. So also did the matter of coordinating the hot water heating system with methods of heating domestic tap water receive close attention in order that maximum economy of operation might be secured. Several of the WPA group housing projects made use of hot water for building heating. Generally, more progress is reported in controlling operation of hot water heating systems by stopping and starting a circulating pump rather than by operating a pump at constant speed and varying the water temperature. Interest in one-pipe distribution methods was revived in the search for economy in first cost.

ASHVE Research

Although the research work of the American Society of Heating and Ventilating Engineers was in course of reorganization during 1936 and, although plans were made to greatly enlarge its future scope, projects which deal with heating and the other winter functions were continued throughout the year. Among such projects either active or projected during 1936 were: performance of direct and indirect radiators with gravity air flow; determination of the proper size of steam pressure reducing valves for different pressure drops; limitations of air velocity and difference in temperature between the room air and the delivered air when unit ventilators are used in schoolrooms; standardization of the calculated drop in temperature through a radiator in forced circulation hot water heating; determination of the simplest and lowest cost low pressure steam and hot water heating systems that can safely be installed in small homes; use of small pipes in forced hot water circulation systems; determination of the effectiveness of commercial insulation; study of fuels; development of a method of eliminating destruction of insulation by moisture in winter.

Although not dealing with winter phases in particular it is of interest to note that during 1936 the revised plan of the American Society of Heating and Ventilating Engineers research gives especial attention to medical aspects of air conditioning. Preliminary work has been done in studying the use of conditioned air as a means of raising blood temperature in fever therapy. It is suggested that similar studies be undertaken on treatment of diseases and that basic standards for the use of air conditioning in hospitals be established. A special committee is supervising studies being made in a Chicago hospital with the establishment of such standards as an objective.

1936 Progress in Winter Equipment



Arco Conditioner

NAME AND MODEL NUMBER—Air conditioners, models 101-B and 201-B.

PURPOSE—An indirect conditioner for use with radiator heating systems. Supplies humidification, circulation, cleaning, and ventilation. Cooling and dehumidification can be added if desired.

FEATURES—A self-cleaning nozzle with integral strainer is used in spray type humidifier to provide moisture. Water from the nozzle is played upon a plate glass target, which can be adjusted to vary the quantity of water taken up by the air. For air cleansing, a replaceable type filter, constructed of corrugated fiber board and arranged to form V-shaped cellular passages, coated with a tacky compound, is used. A centrifugal type blower with special mountings and acoustically lined air outlet, designed to absorb vibration and reduce noise, is used to circulate the conditioned air throughout the house. Outside air, taken in for ventilation, is passed through a tempering coil that warms the air to room temperature and at the same time takes out entrained moisture.

Ordinarily, the conditioner is placed on the ceiling of the basement and only a minimum of standardized air ducts is used to deliver and return the air.

SIZES AND CAPACITIES—Model 101-B is suitable for houses up to 12,500 cu. ft.; model 201-B will provide from 12,500 to 25,000 cu. ft.

MADE BY—*American Radiator Corp., 40 W. 40 St., New York.*

Titusville Ti-Scot Heating Boilers

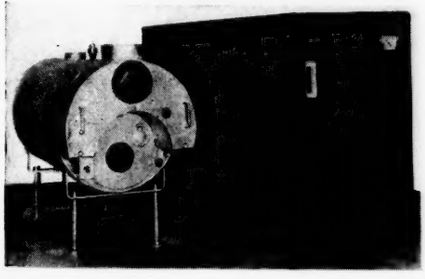
NAME—Ti-Scot scotch marine, oil burning, tubular, steel heating boilers.

PURPOSE—For supplying steam or hot water using oil as a fuel.

FEATURES—The boiler is a low water line marine type boiler built for oil burning. Manufacturer claims a high efficiency due to large furnace volume and two-pass long gas travel area. It is built of copper bearing steel, electrically welded and tested to 130 lb. Either tank or tankless type water heater with submerged copper coils can be supplied with boiler. Standard equipment includes jacket, supporting legs, water column, water gage, gage cocks, safety valve, steam gage, flue brush and Draft-O-Stat.

SIZES AND CAPACITIES—10 sizes ranging from 612 to 2,680 sq. ft.

MADE BY—*The Titusville Iron Works Co., Titusville, Pa.*



Kewanee Air Conditioner

NAME AND MODEL NUMBER—Kewanee RK air conditioner.

PURPOSE—For installation with either hot water or steam boiler. To supply warm, humidified, filtered air during the winter and filtered and circulated air during the summer.

FEATURES—A viscous throwaway type air filter. Heating coil of copper tubes with aluminum fins. Thermostatic control, self-cleaning spray nozzle and blower fan with acoustically-lined venturi discharge.

SIZES AND CAPACITIES—Three sizes from 400 to 700 sq. ft. of equivalent radiation with fan capacity from 1,100 to 2,000 c.f.m.

MADE BY—*Kewanee Boiler Corp., Kewanee, Ill.*

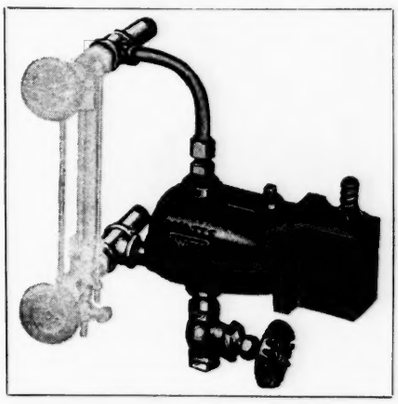
Ideal Packless Convector Valve

NAME AND MODEL NUMBER—Ideal convector packless gate valve No. 475.

FEATURES—Includes all features of the former No. 375 valve and adds packless feature. Especially intended for valves located within enclosures where repacking is difficult.

SIZES AND CAPACITIES—In ½ in., ¾ in., 1 in., and 1¼ in. sizes.

MADE BY—*American Radiator Corp., 40 W. 40 St. New York.*



Watts Low Water Cut-Off

NAME AND MODEL NUMBER—No. 94 low water cut-off.

PURPOSE—To protect automatically fired boilers, either gas, oil, or stoker fired, from danger due to low water level.

FEATURES — Flexible bellows seal acting upon a precision switch of the magnetic principle. The unit has the quick hookup connection so that it can be installed in the present gage glass tapping. Measures 9 in. in length by 3 in. in width.

SIZES AND CAPACITIES—½ hp. maximum, 110 to 220 volts, a.c.

MADE BY—*Watts Regulator Co., Lawrence, Mass.*

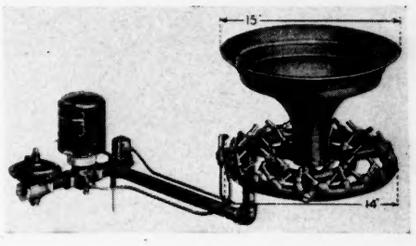
Norge Fine-Air

NAME—Fine-Air heating and air conditioning unit.

PURPOSE—A warm-air type heating and air conditioning unit intended for residences.

FEATURES—Unit is equipped with a Norge oil burner and is designed for homes costing $5,000 to $50,000. It is enclosed in a heavy enamel and chrome cabinet and is equipped with a fan, filter, and humidifier.

MADE BY—*Norge Div., Borg-Warner Corp., Detroit, Mich.*



Barber Conversion Burners

NAME—Barber conversion burners.

PURPOSE—Conversion burners for the combustion of gas in round furnaces or boilers having grates up to and including 20 in. in diameter.

FEATURES—Deflection of heat to the side walls is accomplished by a semi-steel deflector with a deflector ring which produces a scrubbing action of the flame on the side walls. These burners are said to require no refractory elements. The assembly shown (No. X44-B) includes all equipment for automatic control. Burners are also furnished for manual control.

MADE BY—*Barber Gas Burner Co., Cleveland, Ohio.*

Hill Air Conditioner

NAME AND MODEL NUMBER—Hill Air Conditioner and Heat Saver.

PURPOSE—To supply warmed and humidified air, utilizing the heat in the flue gas.

METHOD OF OPERATION—The unit is much like a tube pipe boiler with the hot flue gases passing through the tubes. It is installed between the boiler and the chimney. The lower tubes in the heat saver are covered with water while the upper tubes have air passing over them. The air enters the heat saver just over the surface of the water and carries the moisture to the rooms together with the hot air. A float valve connected to the water supply system maintains the water level in the heat saver.

MADE BY—*Frank M. Hill Machine Co., 50 School St., Walpole, Mass.*

Hershey Motorstokor

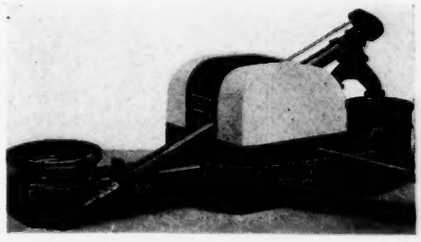
NAME AND MODEL NUMBER—Motorstokor, series 8AF.

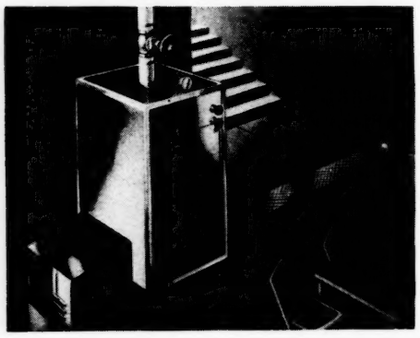
PURPOSE—Stoker for automatically burning anthracite coal, feeding it from a bin and carrying the ashes to cans.

FEATURES—Standard make capacitor type motor with built in overload protection, pressure type self compensating fan, universal type coal bin conveyor which can operate at any angle. V-belt speed reduction with an automatic overload switch, coal feed screw of chrome-moly alloy steel. Burners consist of series of concentric rings designed to distribute air to fuel bed uniformly.

SIZES AND CAPACITIES — Three models, 20 to 40 lb. per hr.

MADE BY—*Motorstokor Div., Hershey Machine & Foundry Co., Manheim, Pa.*





Anchor Bin Feed Kolstoker

NAME—Anchor bin feed Kolstoker.

PURPOSE — A stoker which automatically feeds the coal from the bin to the burner.

FEATURES—Stoker is furnished in either draw conveyor or drive conveyor type. In the draw conveyor type the screw draws the coal from the bin and conveys it under the floor through a feed tube to the burner. A reverse screw arrests the movement of the coal toward the stoker power unit and forces it up through the burner to the fire. In the drive conveyor type, the power unit of the stoker drives or pushes the coal from the bin to the boiler instead of drawing it as in the draw conveyor type. In this case, the stoker power unit is located behind the bin. The illustration shows a bin feed draw conveyor type.

MADE BY—*Anchor Stove and Range Co., New Albany, Ind.*

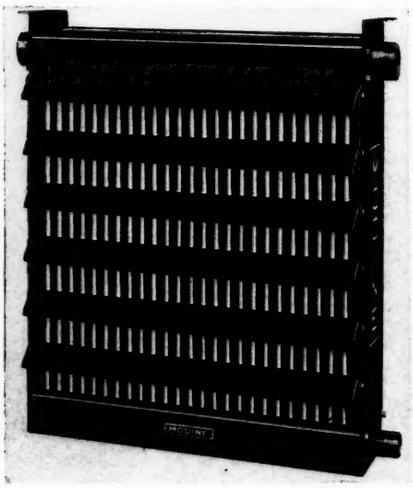
Modine Unit Heaters

NAME AND MODEL NUMBER—620 and 1300 Modine unit heaters.

FEATURES—Model 620 developed to satisfy heating requirements too large for company's model 542 and not great enough to meet required heat of model 710. Available with single, two- and three-speed motors. Model 1300 is the largest of the single condenser, single fan unit heaters in the company's line and incorporates new design features as applied to single condenser units. Furnished with side tappings to save head room.

SIZES AND CAPACITIES — Model 620, 148,800 B.t.u. per hr. at 2 lb. steam and 60F entering air, replaces 620 sq. ft. of cast iron radiator. Model 1300, 312,000 B.t.u. per hr. at 2 lb. steam and 60F entering air, replaces 1300 sq. ft. of cast iron radiator.

MADE BY—*Modine Manufacturing Co., Racine, Wis.*



National Art Radiator

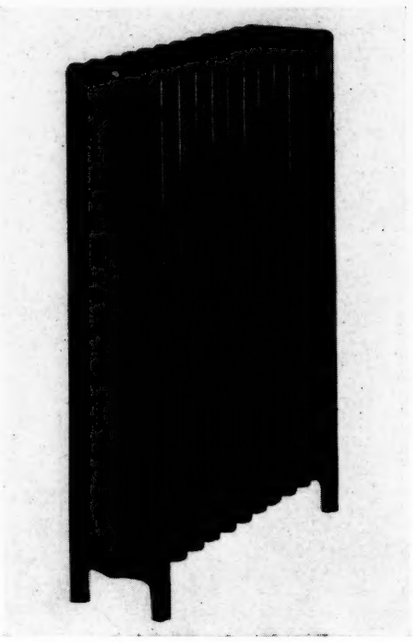
NAME—National Art radiator.

PURPOSE—A small tube type radiator for steam or hot water.

FEATURES—This radiator, according to the manufacturer, represents an entirely new style of radiator surface. The designer has utilized vertical lines and set-back planes in such a manner as to make it harmonize with the vertical lines of window mullions and drape folds. The manufacturer also claims that the units occupy less floor space while giving as much heat as the older type radiators. Radiators are of cast iron construction and are assembled in any length in multiples of 1½ in. Radiators are of push nipple construction and can be furnished without legs.

SIZES—Units are made in three widths; 3, 4, and 5-tube and in heights ranging from 19 to 26 in.

MADE BY — *National Radiator Corp., 221 Central Ave., Johnstown, Pa.*



Janitrol Gravity Heater

NAME—Janitrol gravity heater.

PURPOSE—For supplying warmed and humidified air.

FEATURES—The heater has no bonnet, utilizing instead a streamlined heat distributor in the enclosed head to assure equal heat to each riser. Model has a Multi-Inspirator burner and a humidifier of the pan type.

MADE BY—*Surface Combustion Corp., Toledo, Ohio.*

Alfol Radiator Reflectors

NAME—Alfol heat reflectors.

PURPOSE—To reflect the heat from a radiator back into a room.

METHOD OF OPERATION — Reflector is made of a sheet of aluminum which, it is said, reflects 95% of radiant heat. Sheet of aluminum is cemented to a piece of light sheet metal and is held securely in the back of the radiator by a set of special fastenings. Manufacturer says that when the reflector is installed in this manner 95% of the radiant heat of the radiator is reflected back and the temperature of the air around the radiator is raised from 12 to 20F

MADE BY—*Alfol Insulation Co., Inc., Chrysler Bldg., New York.*

Master Kraft Fuel Saver

NAME—Master Kraft Fuel Saver.

PURPOSE—For adding direct heating surface to round boilers.

FEATURES—Device as illustrated is a gray iron casting with ½-in. wall thickness finished on outside with rust preventive coating. Has no square corners or pockets to hold accumulation of mud, sludge, or insulating deposits. It is connected into the firebox over the fire. Horizontal outlet is connected to return piping and vertical outlet to upper part of the boiler. Adds 6 sq. ft. of heating surface and consequently said to increase the boiler capacity approximately 100 sq. ft. of steam radiator.

MADE BY—*Harvey-Whipple Inc., Springfield, Mass.*

Boiler Scale Remover and Eliminator

NAME—Elek-Trol-ik.

PURPOSE—To remove boiler scale and eliminate corrosion.

FEATURES—Manufacturer claims that the device will produce an electrolytic action within the boiler to produce corrosion that is said to destroy all boiler scale without damage to plates or tubes.

SIZES AND CAPACITIES—For use in boilers up to 100 hp.

MADE BY—*Oneida Electric Mfg. Co., Green Bay, Wis.*

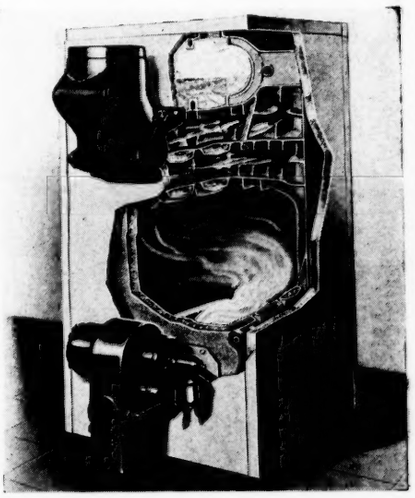
Timken Boiler Burner

NAME AND MODEL NUMBER—GC Boiler-burner unit.

FEATURES—Moving parts said to have been reduced to a minimum for pressure type burners, has form control device for controlling of air supply.

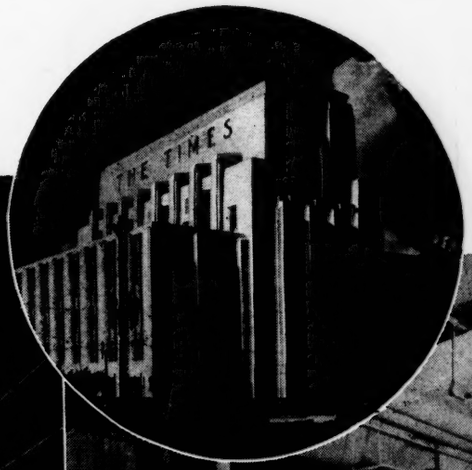
SIZES AND CAPACITIES—Five sizes ranging from 510 to 1,090 sq. ft. of steam radiator.

MADE BY — *Timken Silent Automatic Co., Detroit, Mich.*

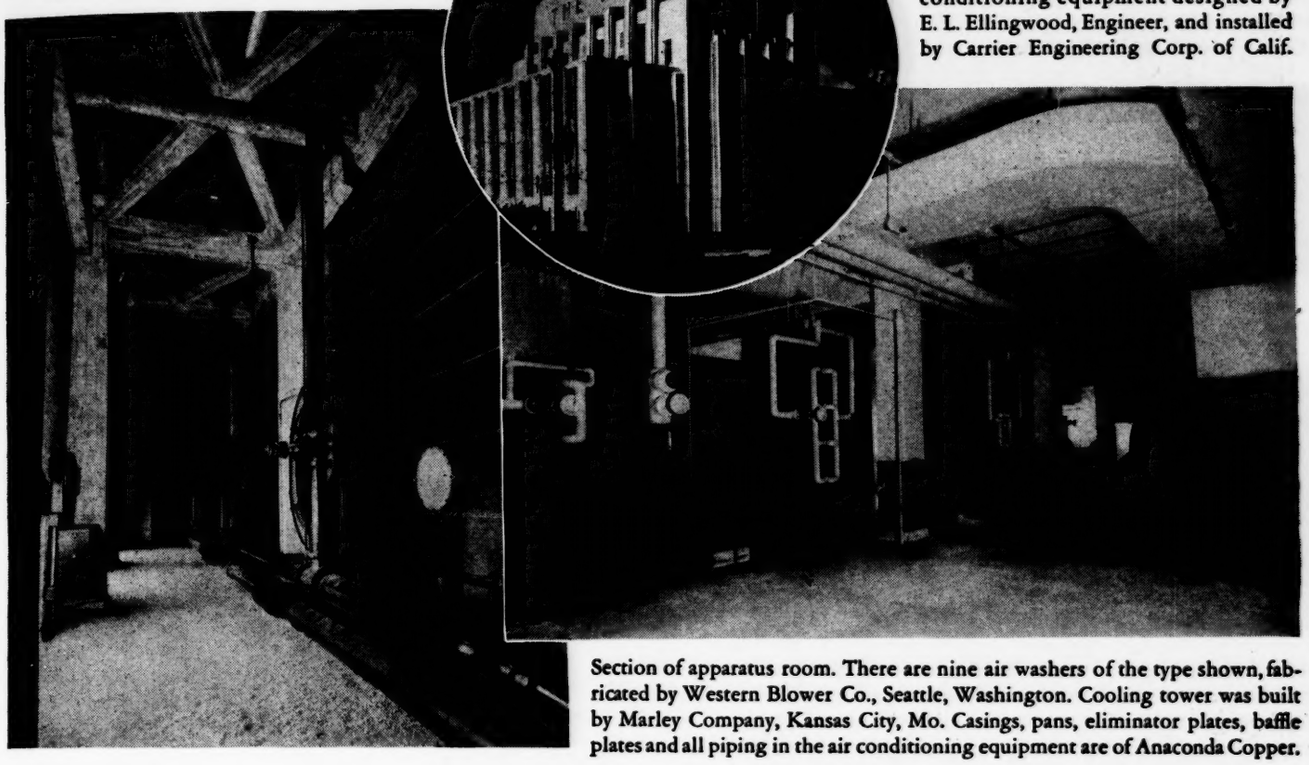


The New LOS ANGELES TIMES *Building*

Lower view of forced draft cooling tower casing. Tower is 22 ft. wide, 60 ft. long and 45 ft. high, constructed of Anaconda Copper. Cooling rate is 2400 gal. per min. through a temperature range of 32° F.



Building planned and designed by the Office of Gordon B. Kaufmann; Erected by P. J. Walker Company, Builder; Air conditioning equipment designed by E. L. Ellingwood, Engineer, and installed by Carrier Engineering Corp. of Calif.



Section of apparatus room. There are nine air washers of the type shown, fabricated by Western Blower Co., Seattle, Washington. Cooling tower was built by Marley Company, Kansas City, Mo. Casings, pans, eliminator plates, baffle plates and all piping in the air conditioning equipment are of Anaconda Copper.

another important air conditioning installation takes advantage of Copper

In the new Los Angeles Times Building, 175 rooms are air conditioned. The section of the building housing offices is supplied with 150,000 cubic feet of air per minute to maintain a temperature of 75° F. with 50% relative humidity. The printing plant is supplied with 125,000 cubic feet of air per minute to maintain a temperature of 78° F. with relative humidity at 55%.

Naturally, for a building of this type, the air conditioning equipment was designed to be as permanent and trouble-free as modern engineering and metallurgy could make it—hence the extensive use of Anaconda Copper in the vital parts of this installation as insurance against costly and annoying shutdowns, repairs and replacements caused by rust and corrosion.

Anaconda Copper and its alloys are being efficiently and economically used for ducts and louvers, spray chambers, nozzles, cooling towers, condensers, and many other applications in the air conditioning field. Anaconda engineers will be glad to help determine the most serviceable metal for any specific application. 3660

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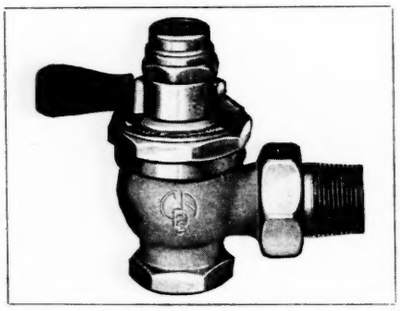
General Offices: Waterbury, Conn.
Offices and Agencies in Principal Cities

ANACONDA
from mine to consumer

ANACONDA COPPER & BRASS



Dunham Adjustable Regulating Valve

NAME AND MODEL NUMBER—Dunham adjustable radiator valve, type 174.

PURPOSE—A regulating valve containing an adjustable regulating plate which makes it possible to change the size of the orifice without disconnecting the radiator.

FEATURES—Valve is designed for use with the Dunham Differential vacuum heating system. Valve is said to be adaptable to existing heating systems where heating satisfaction is low because of lack of balanced steam distribution. The valve is said to be particularly valuable where the heating requirements of one or more areas in a building are changed by the repartitioning of floors. The manufacturer states that the bellows diaphragm construction makes the valve packless and leakproof and that neither steam, air, water, nor sediment can come in contact with the adjusting or operating mechanism.

SIZES—Valve is available in all styles and patterns. It can be furnished in lever and wheel handle, or lock and shield type and in angle, straightway, right hand, and left hand patterns for each of these types. Can also be furnished with a special extension stem where the valve is installed behind a grille.

MADE BY—*C. A. Dunham Co., 450 E. Ohio St., Chicago.*

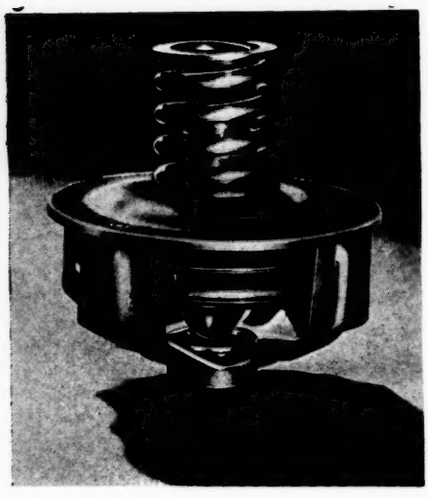
B. & J. Cage Unit for Traps

NAME—Barnes & Jones cage-unit.

PURPOSE—For replacement of thermostatic unit in radiator trap.

FEATURES—Complete thermostatic unit locked in adjustment with any radiator trap. Can be replaced easily and quickly by unskilled labor with no special tools and no adjustments.

MADE BY—*Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.*



Lewis Mechanical Warm Air Conditioner

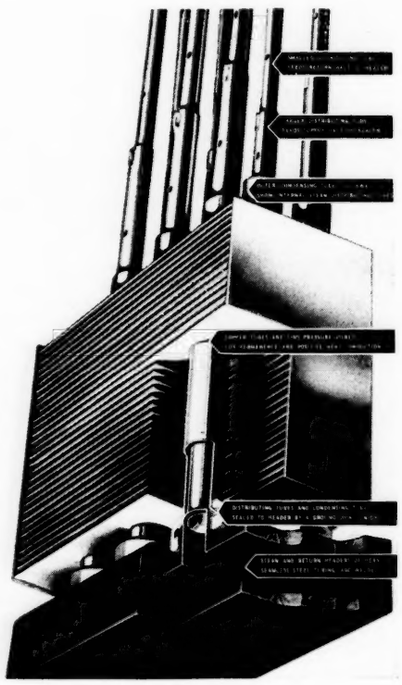
NAME—Lewis mechanical warm air conditioner.

PURPOSE—Winter air conditioning; can be used for summer conditioning if electrical refrigeration or water cooling is supplied.

FEATURES—Air is preheated before being filtered and humidified and then passed over the combustion chamber. Designed to operate with oil or gas burner. Humidifies, filters, and circulates the air. Occupies 23 sq. ft. of floor space. Housed in furniture steel with aluminum trim.

SIZES AND CAPACITIES—Available in four models with capacities ranging from 120,000 to 225,000 B.t.u. per hr. at the bonnet.

MADE BY—*Lewis Air Conditioners, Inc., 1600 Northeast Broadway, Minneapolis, Minn.*



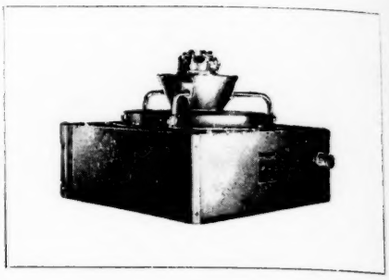
Nesbitt Heat Transfer Surface

NAME—Nesbitt heat transfer surface.

PURPOSE—For steam heating in blast systems and smaller applications.

FEATURES—Use of two internal tubes inside external tubes to which fins are attached. Exterior tube connects steam and return headers as does the smaller internal tube. The larger internal tube extends from the steam header one-half the length of the heater and is pierced with a number of small orifices through which steam is fed to the steam half of the finned or exterior tube. The smaller internal tube is similarly pierced for the half of its length which projects beyond the larger tube. All orifices are metered to admit the proper proportions of steam to each half of the heater. This together with proper spacing of the orifices is said to assure uniform steam distribution throughout the heater, regardless of steam pressure or quantity of steam supplied, and consequently gives air uniformly heated over entire face area of heater. While these tubes are new for fan system surface they have been used for five years in the radiators of unit ventilators made by the manufacturer.

MADE BY—*John J. Nesbitt, Inc., Holmesburg, Philadelphia, Pa.*



Wing Unit Heater

NAME AND MODEL NUMBER—Unit heater type G.

PURPOSE—Garage heating and similar large spaces.

FEATURES—Consists of combined electric and steam directional heater. Compact. Heat supplied from existing steam lines. Copper heating surface.

MADE BY—*L. J. Wing Mfg. Co., New York.*

American Radiator Hot Water Elbows

NAME—American Radiator balancing elbows.

PURPOSE—Elbows are for installation in radiator return connections and make possible the adjustment of the flow of water to each radiator.

FEATURES—Elbows contain an adjustable baffle which can be set after the system is in operation, without draining the pipes. Can be used on either gravity or forced circulation jobs.

SIZES AND CAPACITIES—In ⅜ in., ½ in., and ¾ in. sizes.

MADE BY—*American Radiator Co., 40 West 40 St., New York.*

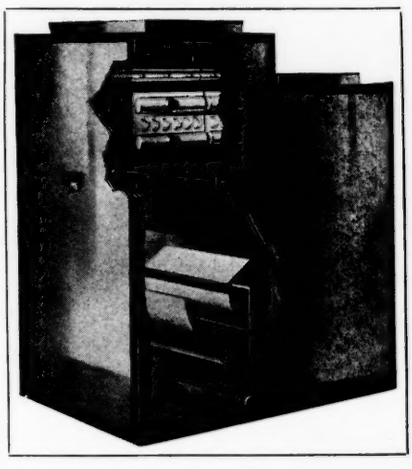
Electrol S-S Air Conditioner

NAME AND MODEL NUMBER—Electrol S-S Series Split-System conditioner.

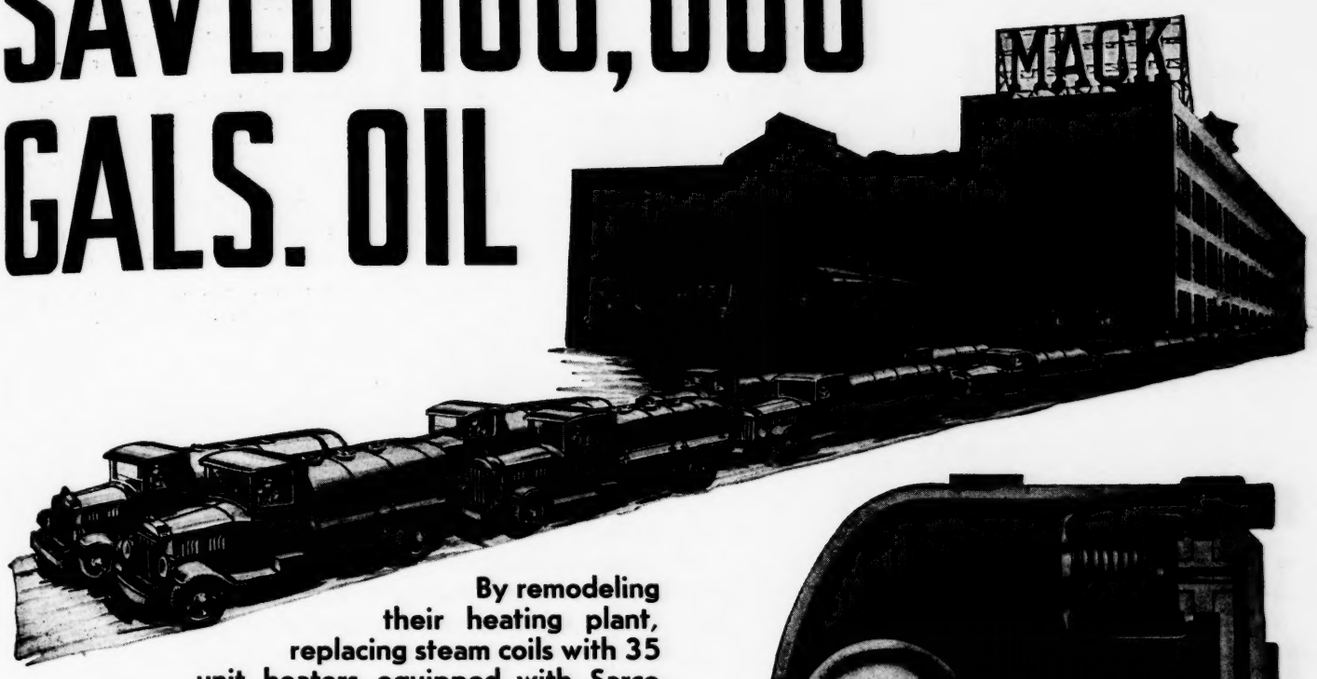
FEATURES—Consists of a blower unit containing circulating fan, air filters, humidifier and heating coil. Designed to be connected to a radiator heating system to supply conditioned air to certain rooms.

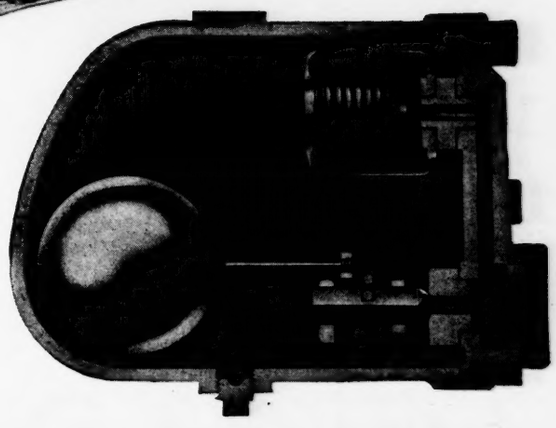
SIZES AND CAPACITIES—Available in four models with heating capacities ranging from 365 to 1,275 sq. ft. of steam radiator, and with an air capacity of 1,120 to 3,600 c.f.m. With 40 F water the cooling capacity of the unit ranges from 34,250 B.t.u. to 98,500 B.t.u. per hr.

MADE BY—*Electrol Inc., 934 Main Ave., Clifton, N. J.*



SAVED 100,000 GALS. OIL





By remodeling their heating plant, replacing steam coils with 35 unit heaters equipped with Sarco Float and Thermostatic Steam Traps and equipping radiators in the offices with 427 Sarco Radiator Traps, the Mack-International Truck Co., Long Island City, reduced fuel oil consumption 100,000 gals. in one season, according to article in Heating & Ventilating.

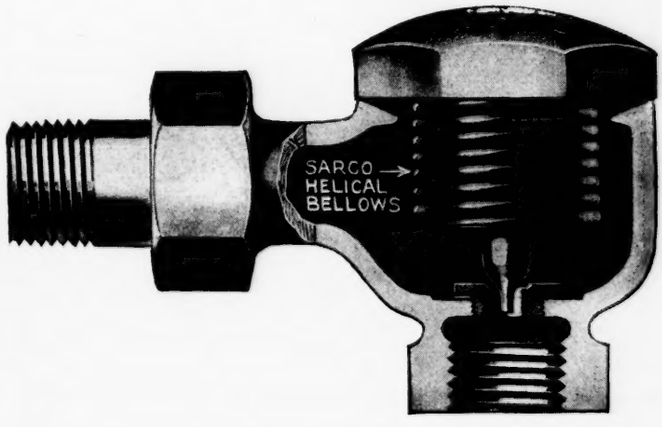
SARCO HEATING SYSTEM

has materially reduced the fuel bills in hundreds of buildings.

In our experience of over 25 years we have learned many ways of improving heating systems. Perhaps we could help you by applying some of these ideas to buildings on which you are working.

For the convenience of architects, engineers and contractors we maintain a competent force of practical heating engineers who are available for consultation on heating problems without charge or obligation.

Write us and also ask for Catalog P-45, or mail the coupon.



SARCO CO., INC.
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Sarco Canada Limited, Federal Bldg., Toronto, Ont.

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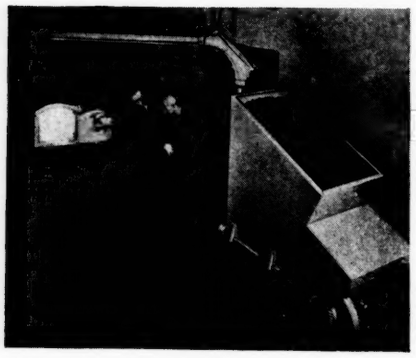
City .....State.....

Iron Fireman Pneumatic Spreader

NAME—Pneumatic spreader.

PURPOSE — For spreading coal over the grates of a boiler; said to combine best features of overfeed stoker and powdered coal burner.

FEATURES — Fines and lump coal up to 1½ in. are carried into furnace on the stream of air. Finer particles burn in suspension, with flame similar to that produced by a powdered coal burner. Larger pieces burn in a shallow layer on the grates. Is not necessary to rebuild boiler front; the cutting of a hole in the boiler front large enough to admit the spreader nozzle is sufficient. Particularly



adapted to firing of power and process boilers for industrial uses.

SIZES AND CAPACITIES—In five sizes, with capacities ranging from 75 to 500 boiler hp., and in either hopper or bunker models.

MADE BY — *Iron Fireman Manufacturing Co., Portland, Ore.*

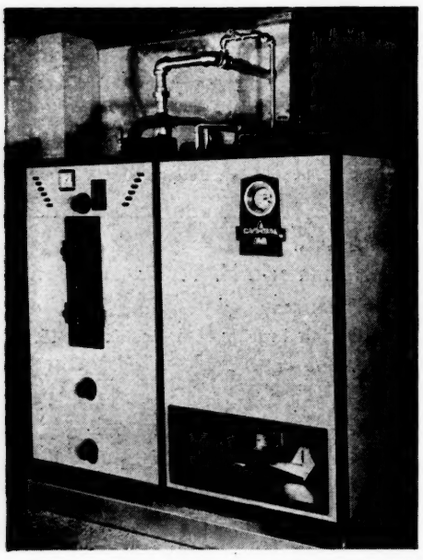
Gaskoal Pulverized Coal Boiler

NAME—Gaskoal unit.

PURPOSE—Building heating using pulverized coal.

FEATURES—Burns coal pulverized to a fineness of 93%, 200 mesh. Pulverized fuel is delivered to the storage hopper in the consumer's basement by a hose under 4-lb. pressure. After coal is stored in hopper it is fed by feeder using a toothed wheel which carries coal through tube where it is taken by vacuum into inlet of exhaust fan, then through flexible tubing to burner nozzle. Secondary air is supplied by exhauster through tube leading into burner assembly housing. Automatic thermostatic control. Gas flame acts as pilot and ignites pulverized fuel and air mixture.

MADE BY—*Gaskoal Corp., Chicago, Ill.*



Sturgis Heat Booster

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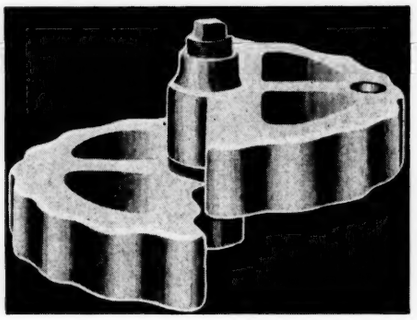
PURPOSE—To increase the heat surface of boilers.

FEATURES—Constructed of two cast iron sections fitted together with a water-tight ground joint and held together by a bolt to prevent warping. By removing the cap nut and the nut on a larger inside bolt, the Booster may be taken apart so that it can be installed through the firebox door. The manufacturer claims that the design makes the booster an effective flame baffle. It is said that the unit can be installed without disturbing hot water coils already placed in the boiler.

MADE BY — *Whitehall Equipment Corp., 17 Battery Place, New York.*



Stay-Rite Trap

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PURPOSE—Radiator trap for steam and vacuum systems.

FEATURES—It has only one soldered joint and has a full floating self-centering valve in addition to the thermostat. The seat is of stainless steel and is removable. It is said to have been developed especially for reducing maintenance cost.

SIZES—Available in three models, ½ in. angle, ½ in. offset, and ¾ in. angle.

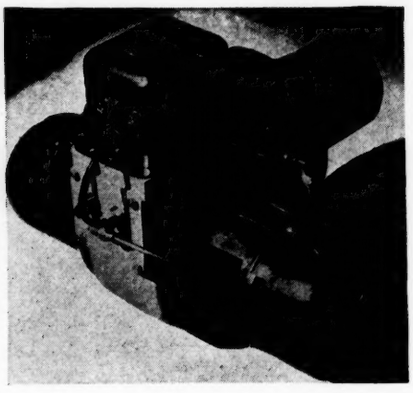
MADE BY—*Stay-Rite Co., Inc., 1250 West 4 St., Cleveland, Ohio.*

Bethlehem-Doe Flange Type Oil Burner

NAME AND MODEL NUMBER—Model FE flange type oil burner for enclosed oil burning boilers.

FEATURES—Has monitor type motor-fan-pump unit which can be removed bodily for servicing. Also has live rubber cradle mounting for support of pump unit. Flame diffuser is of the company's Rotaire diffuser type.

MADE BY—*The Bethlehem Foundry & Machine Co., Bethlehem, Pa.*



Roto Combustion Chamber

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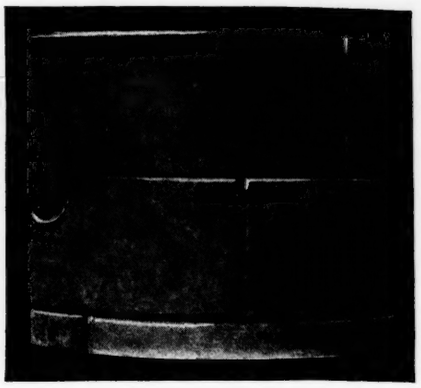
PURPOSE—A combustion chamber for gun type oil burners.

FEATURES—Combustion chamber is made up of refractory insulating materials and comes ready to install with no cementing necessary. Manufacturer claims that it fits all type gun burners and can easily be installed in any furnace or boiler. It is said that the surface temperature of the combustion chamber reaches a high degree soon after the burner starts and thus results in a maximum efficiency.

MADE BY—*The Rex Clay Products Co., 14400 Dexter Blvd., Detroit, Mich.*



Lee Unit Type Heaters

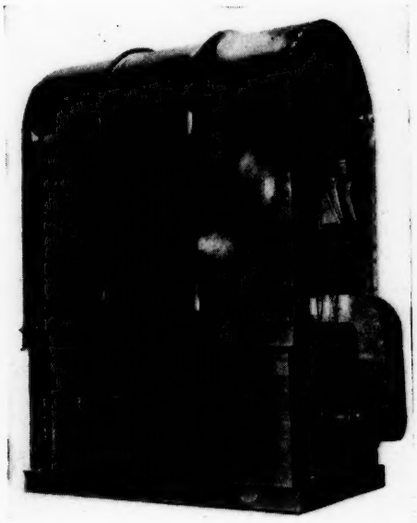
NAME—Lee unit type air heater.

PURPOSE — For heating industrial buildings or for space heating. Especially designed for buildings where heat is required for only a short period each year.

FEATURES — Available for hand or stoker coal burning or for oil burning. Can be used to discharge air horizontally from the heater into a room or can be connected to a duct system. A third arrangement is to supply the heated air to the room from the base of the heater so as to keep the floor warm in such applications where material such as steel sheets may be stored on the floor and it is desired to prevent rusting.

SIZES AND CAPACITIES—Available in two sizes with capacities of 300,000 and 700,000 B.t.u. per hr., in standard models. Also available in tubular type central type heater with capacities up to 700,000 B.t.u. per hr.

MADE BY—*Dravo-Doyle Co., Pittsburgh, Pa.*



GOOD HEATING
underwrites
GOOD DESIGN

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Differential
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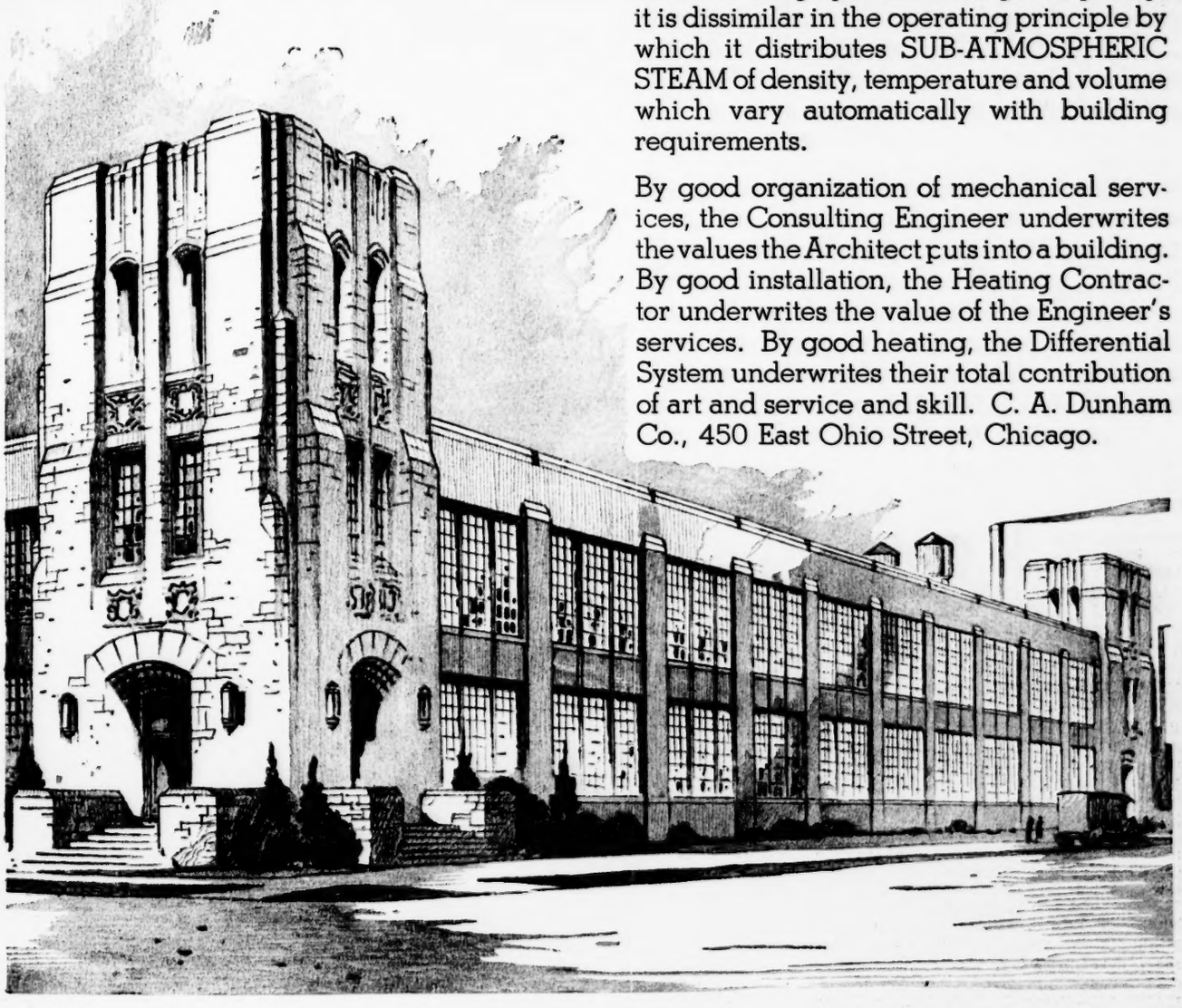

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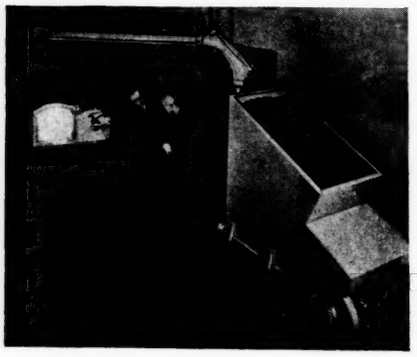

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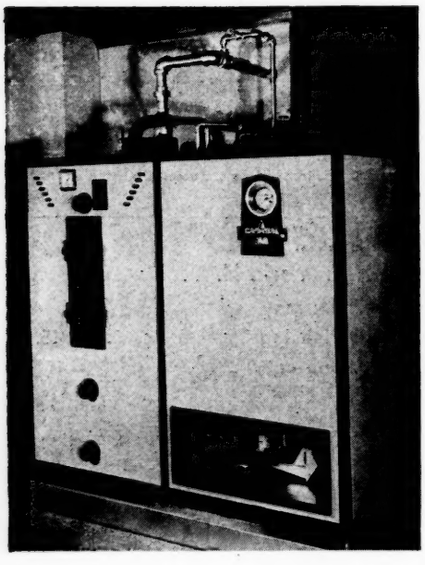

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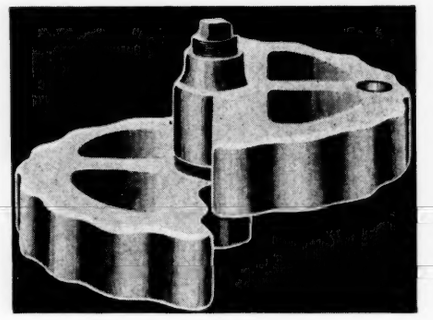
MADE BY — *Whitehall Equipment Corp., 17 Battery Place, New York.*



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SIZES—Available in three models, ½ in. angle, ½ in. offset, and ¾ in. angle.

MADE BY—*Stay-Rite Co., Inc., 1250 West 4 St., Cleveland, Ohio.*

Bethlehem-Doe Flange Type Oil Burner

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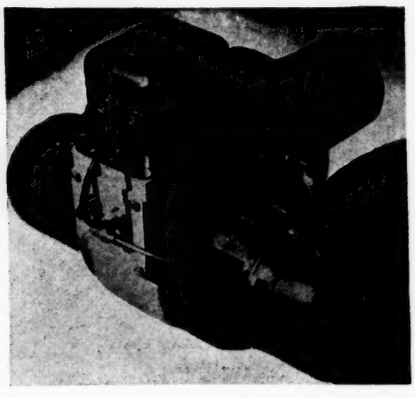

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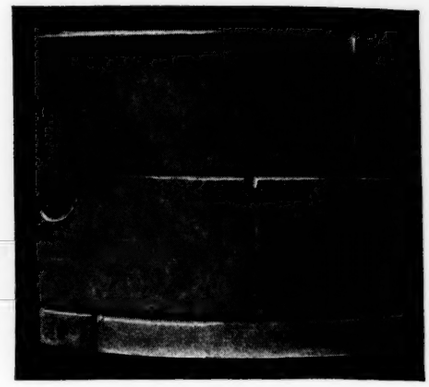

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SIZES AND CAPACITIES—Available in two sizes with capacities of 300,000 and 700,000 B.t.u. per hr., in standard models. Also available in tubular type central type heater with capacities up to 700,000 B.t.u. per hr.

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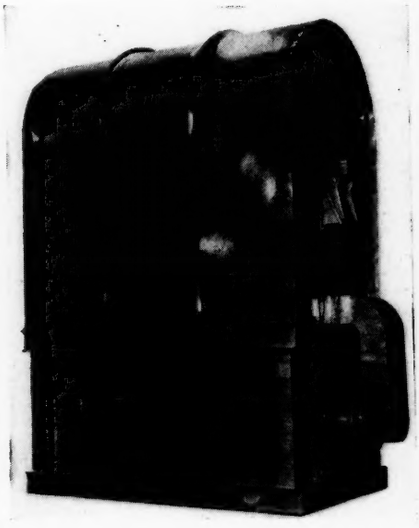

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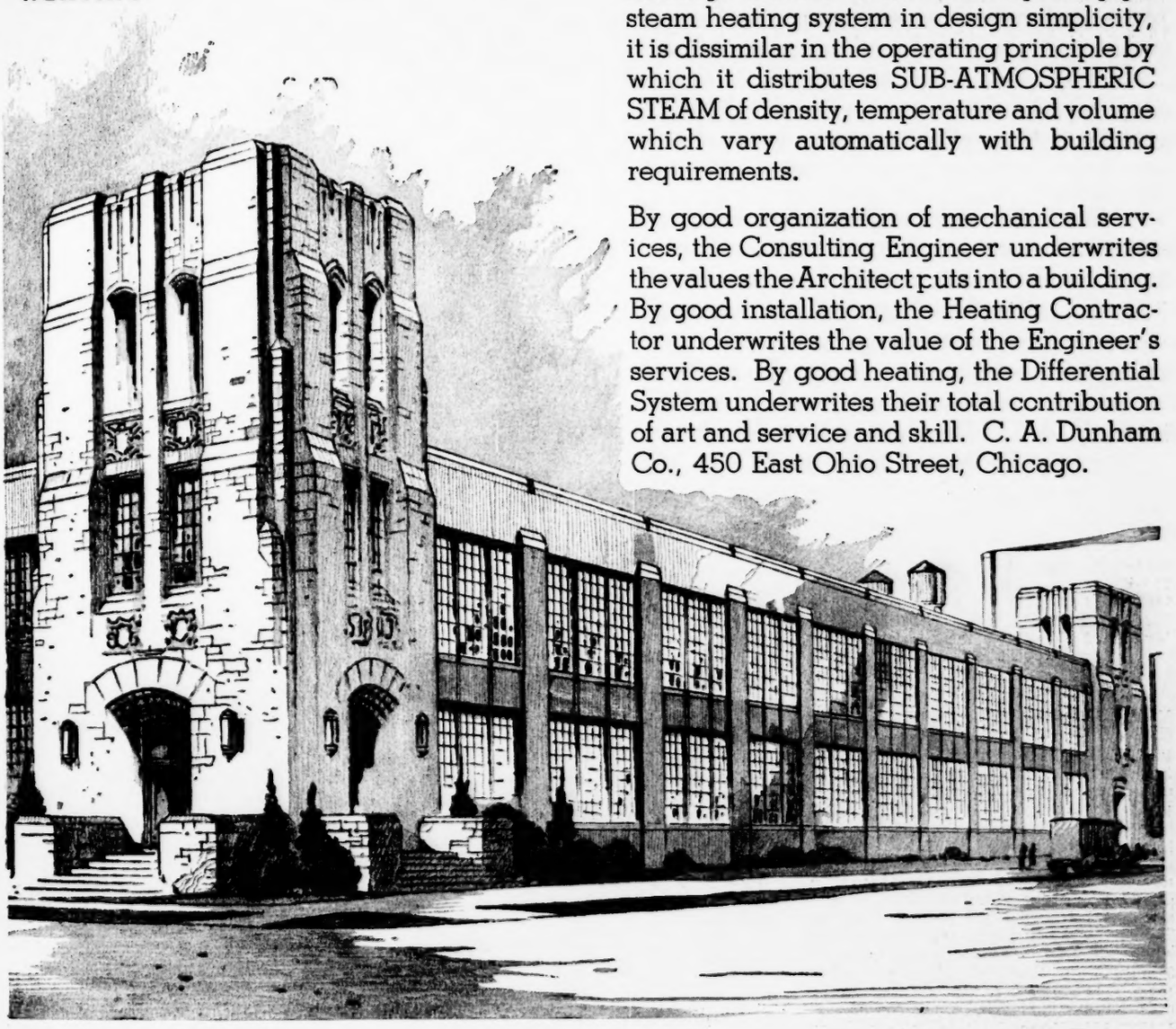
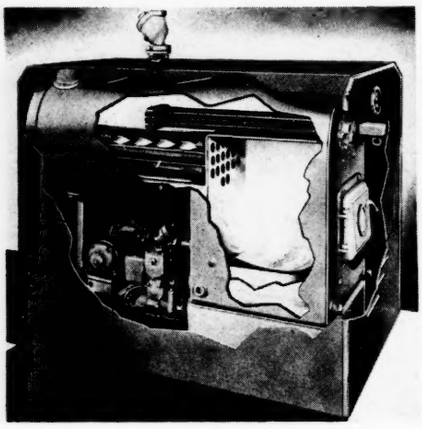




Orr & Sembower Burner Unit

NAME—Oil-O-Matic boiler-burner unit.

PURPOSE—To supply steam and hot water, utilizing oil as a fuel.

FEATURES — Turbulators installed in flue tubes to increase temperance of gases. One piece assembly of base and fire chamber of a moulded refractory. Fire chamber is insulated on all sides with rock wool and mounted on a 2 in. magnesia pad. Steam unit is equipped with a low-water cutout to protect the boiler. Hot water units are equipped with a single flow valve to keep boiler water from circulating through heating system during summer months and with a booster pump to increase circulation through heating system during the winter. Units are equipped with either storage or instantaneous hot water coils.

SIZES AND CAPACITIES — Six sizes from 360 to 1,260 net installed steam radiator surface.

MADE BY—*Orr & Sembower, Inc., Reading, Pa.*

Pierce Oil Boiler

NAME—Pierce oil boiler.

PURPOSE—Designed for use with, but does not include, oil burner.

FEATURES—Has water leg construction so that combustion chamber is completely surrounded by water. Products of combustion make two passes before being drawn into the three-way indirect heating surface passages. Finished in two-toned gray enamel jacket backed by asbestos and sound-proofing material. Has refractory-lined Pyrex glass inspection door.

SIZES AND CAPACITIES—Available in six sizes with steam radiator loads ranging from 570 to 1520 sq. ft., and for minimum burner capacities of 1.22 to 3.23 gal. per hr.

MADE BY—*Pierce, Butler Radiator Corp., Syracuse, N. Y.*

Master Kraft Warm Air Unit

NAME AND MODEL NUMBER — Master Kraft Conditioned Warm Air Heating Unit.

PURPOSE—Winter air conditioning, consisting of filtering, heating, circulating and air moistening, utilizing oil as a fuel.

FEATURES—A double sized radiator which is said to increase considerably the amount of heat obtained. Heater has but two joints, one sealed with insulation and refractory and the other sealed by iron to iron construction protected by high temperature cement on both sides. Oil burner is of gun type with a Thermo overload release switch to prevent burned out motors.

SIZES AND CAPACITIES — Four units, 100,000 to 190,000 B.t.u. per hr. at the register.

MADE BY—*Harvey-Whipple, Inc., 55 Emery St., Springfield, Mass.*

Hoffman 500 Conditioner

NAME AND MODEL NUMBER — Hoffman Model 500 air conditioner.

PURPOSE—For use in connection with radiator heating.

FEATURES — Humidifies, cleans, and circulates the air. Humidification is by a fine water spray; cleaning is by means of a dry 16 x 20 in. filter and air washer, with eliminator. Air is conducted through a duct system to registers under radiators in the room. Blower is provided with a motor-driven fan. Spray nozzle is of the Hoffman type and is self-flushing with a double jet impingement feature. Humidity is controlled by a standard solenoid valve. Fan is a slow speed forward curve multiblade type V-belt driven. Motor is 1,750 R.P.M. ⅛ hp.

SIZE AND CAPACITY—Available in one size with a capacity up to ten average rooms. With normal duct resistance unit has an air capacity of 450 c.f.m., a humidifying capacity of 20 gal. per day. Weight, 225 lb.

MADE BY—*Hoffman Specialty Co., Inc.*, 500 Fifth Ave., New York.

Condensation Eliminator

NAME—Condensation eliminator.

PURPOSE—To eliminate condensation from the flue gases discharged from gas heating plants.

FEATURES—Unit consists of a corrosion-proof box installed at the base of a chimney and connected to acid-proof flue lining. Condensed water is caught and stored in the base of the chimney. This water, with acid content, is reevaporated after the plant is in operation some time. The manufacturer claims that the eliminator displaces the common draft diverter and controls both down and updraft.

MADE BY—*Condensation Engineering Corp., 335 S. Western Ave., Chicago.*

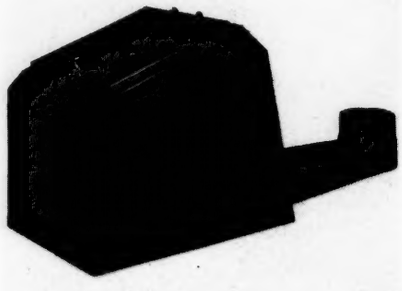
Kelvinator Stoker

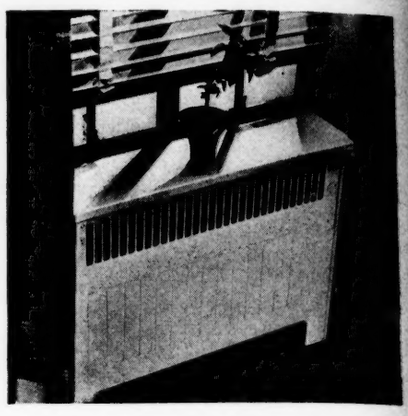
NAME—Kelvinator stoker.

FEATURES—Available in five models, two smallest being for small and medium sized residences, three largest for large residences, apartments, stores, etc. Of the underfeed screw type with controlled forced draft, stoker provides for complete combustion of all the fuel. Air is delivered to the full bed through a tuyere block. Transmission is of the agitated type, equipped with five speeds. Safety features include limiting device to prevent overheating of the furnace or boiler, shear pin of soft steel to prevent harm to the mechanism in case metal or other foreign matter gets into fuel supply worm, and overload protection by means of automatic resetting overload switch.

SIZES AND CAPACITIES—Capacities range from 7 to 150 lb. of coal. Smallest size has a hopper capacity of 350 lb., while all other models have hopper capacities of 500 lb. Hoppers are constructed of 14 gage, welded, seamless copper bearing steel with cast iron base.

MADE BY—*Kelvinator Corp., Detroit, Mich.*





Arco Enclosures

NAME—Arco enclosures.

PURPOSE—An enclosure for the Arco radiant convectors.

FEATURES—This convector was designed to provide radiant heat for the Arco concealed radiator and to retain at the same time all the advantages of the standard convector, including those of concealed radiators, space economy, and accessibility for cleaning. A live radiant heat panel of cast iron replaces the front section of a regular fin type convector heating unit so that this panel can be fitted flush to an especially prepared opening in the enclosure. The plate is finished in a priming coat of grey and can be painted with the enclosure. The installation practice is the same for the company's regular convector units.

MADE BY—*American Radiator Co., 40 W. 40th St., New York.*

Century Oil Furnace

NAME—Century oil furnace.

PURPOSE—For supplying warm air, utilizing oil as a fuel.

FEATURES—Unit is of all-steel welded construction with steel tubes. Copper alloy steel is used in the crown sheet and base sheet.

The furnace is equipped with a combination firing unit provided with a pre-cast combustion chamber poured into a permanent all-metal combustion chamber drawer, on the front of which is a mounting plate which carries the company's model U oil burner. The furnace is enclosed in a square cabinet type jacket available in several colors.

SIZES AND CAPACITIES — In three sizes, capacities ranging from 117,000 to 285,000 B.t.u. per hr. and with nozzle capacities from 1 to 2½ g.p.h.

MADE BY—*Century Engineering Corp., Cedar Rapids, Ia.*

AFCO Oil Burning Unit

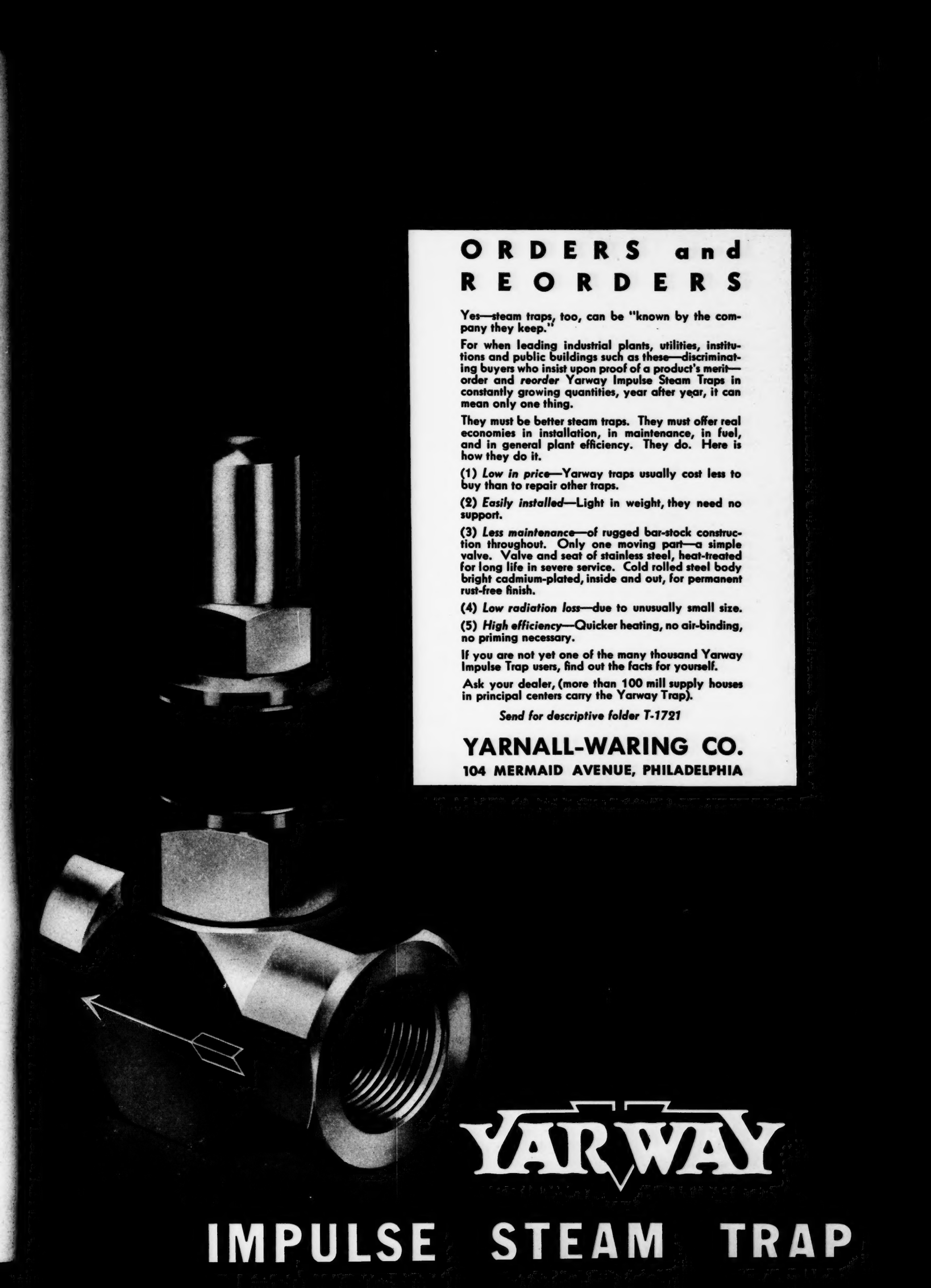
NAME AND MODEL NUMBER—AFCO Air Stream Oil Burning Unit.

PURPOSE—Supplies humidified, filtered, circulated and warmed air, utilizing oil as a fuel.

FEATURES—Viscous type air filters for cleaning; a full floating, centrifugal type blower for air circulation; gun type oil burner with electric ignition for heating and either a drip type or control type humidifier for adding moisture to the air. The combustion unit is fabricated of a heavy boiler plate—8 gauge for the combustion chamber and 14 gauge for the secondary surface. The cabinet is of double wall construction made up of heavy sheet iron inner and outer walls with ½ in. asbestos insulation between them.

SIZES AND CAPACITIES—Four sizes from 141,000 to 564,000 B.t.u. per hour input.

MADE BY—*American Furnace Co., 2719 Delmar Blvd., St. Louis. Mo.*



ORDERS and REORDERS

Yes—steam traps, too, can be "known by the company they keep."

For when leading industrial plants, utilities, institutions and public buildings such as these—discriminating buyers who insist upon proof of a product's merit—order and *reorder* Yarway Impulse Steam Traps in constantly growing quantities, year after year, it can mean only one thing.

They must be better steam traps. They must offer real economies in installation, in maintenance, in fuel, and in general plant efficiency. They do. Here is how they do it.

(1) *Low in price*—Yarway traps usually cost less to buy than to repair other traps.

(2) *Easily installed*—Light in weight, they need no support.

(3) *Less maintenance*—of rugged bar-stock construction throughout. Only one moving part—a simple valve. Valve and seat of stainless steel, heat-treated for long life in severe service. Cold rolled steel body bright cadmium-plated, inside and out, for permanent rust-free finish.

(4) *Low radiation loss*—due to unusually small size.

(5) *High efficiency*—Quicker heating, no air-binding, no priming necessary.

If you are not yet one of the many thousand Yarway Impulse Trap users, find out the facts for yourself.

Ask your dealer, (more than 100 mill supply houses in principal centers carry the Yarway Trap).

Send for descriptive folder T-1721

YARNALL-WARING CO.

104 MERMAID AVENUE, PHILADELPHIA

YARWAY

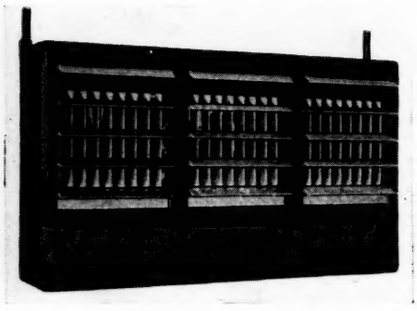
IMPULSE STEAM TRAP

Bryant Gas-Fired Unit Heaters

NAME AND MODEL NUMBER—Bryant gas-fired unit heaters, models 85 and 85-C.

PURPOSE—Unit heaters utilizing gas as a fuel.

FEATURES—Built-in draft diverter and rear flue outlet. All controls on this equipment with the single exception of the combination snap valve and gas pressure regulator at the rear of the unit, are self-contained within the heater cabinet. All primary equipment such as gas burners, fans, controls, etc., are easily accessible for servicing through removable grilles at the back of the unit. The control equipment has a master regulator and combination snap valve and gas pressure regulator all controlled by a sail valve acting as a check on burner operations and preventing the burning of gas except during periods of fan operation. Model 85 units are furnished with heavy sheet steel combustion chambers and flue collectors and steel heat exchanger tubes, while 85-C units are furnished with cast iron combustion chambers and flue collectors and chromium steel alloy



heat exchanger tubes. Type AG or garage type units available for installation in hazardous atmospheres. Unit illustrated is model 3A-85.

SIZES AND CAPACITIES—Three standard sizes, 85,000, 170,000 and 255,000 B.t.u. input per hour.

MADE BY—*The Bryant Heater Co., 17825 St. Clair Ave., Cleveland, Ohio.*

American Radiator Hot Water Valves

NAME—Tight-close radiator valves.

PURPOSE — For installation on hot water radiators.

FEATURES—Valves are made in both packless or packed types and do not contain a circulation hole. The packless valve is also supplied with an equalizer that can be adjusted after the system is in operation to balance the flow of water.

MADE BY—*American Radiator Co., 40 West 40 St., New York.*

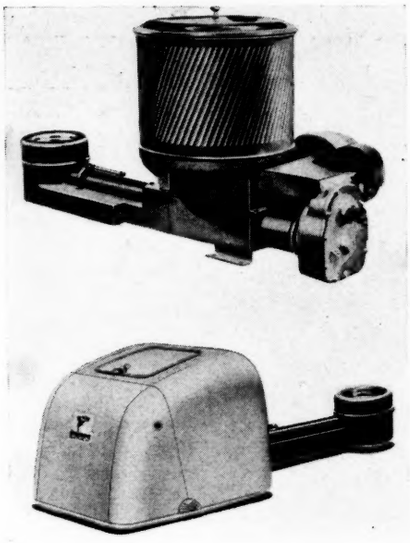
Electric Air Heaters

NAME—Electromode heaters.

PURPOSE—For heating, using electricity as an energy source.

FEATURES—Element used is of cast aluminum construction. Heating is done by means of a calrod around which the aluminum grid is poured. Shrinking of the metal in cooling causes the calrod to become an integral part of the heating element and is said to eliminate all hot wires and dead air spaces. Each unit is thermostatically controlled. The unit is of the built-in type with only the grille work exposed in the room.

MADE BY—*The Electric Air Heater Co., Div. American Foundry Equipment Co., 555 Byrkit St., Mishawaka, Ind.*



Upper view is the model 38 stoker, while below is the streamlined model 37.

Butler Stokers

NAME AND MODEL NUMBER—Standard model No. 38 and Streamlined model No. 37 stokers.

PURPOSE—Domestic stokers.

FEATURES—Except for hopper and hopper base construction models are almost identical, having the same gear box, fuel and air ducts and retort base and interchangeable retort and tuyere combinations to provide tailor-made air distributions to fit the various coals found in each section. The Standard model has cylindrical hopper diagonally corrugated, while model 37 has a streamlined hopper. Features of both are their low price.

SIZES AND CAPACITIES—Model 38 is available in four capacities, sizes ranging from 18 to 50 lb. per hr. of fuel.

MADE BY—*Butler Manufacturing Co., Kansas City, Mo.*

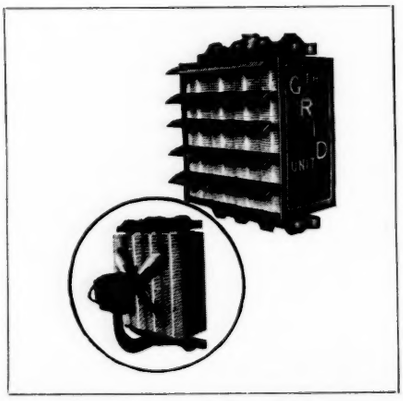
Grid Unit Heater

NAME AND MODEL NUMBER—Grid unit heater, Nos. 515, 520, 525, and 530.

FEATURES—All-cast aluminum heating sections bound to the steam chamber in such a manner that it is said to prevent electrolysis. These new units are identical with other units of the Grid line except for size.

SIZES AND CAPACITIES—Four sizes with capacities ranging from 56,750 to 248,000 B.t.u. per hr.

MADE BY — *Unit Heater & Cooler Co., Wausau, Wis.*



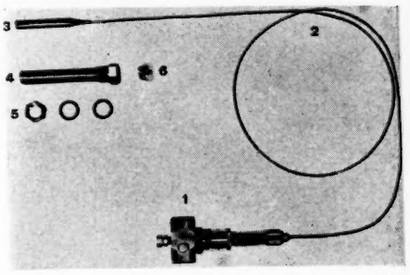
Yarway Steam Controlled Valve

NAME—Yarway automatic steam control valve.

PURPOSE—For connection to the outlet or condensate end of steam heating coils in water heaters and in various types of industrial process equipment in which close regulation of temperature is required. When so connected, this valve is said to eliminate use of steam regulators and steam traps and frequently with pressure reducing valves.

Valve (1) is of throttling type, operated by thermostatic element (2) of bulb and bellows design. Temperature adjusting sleeve covering bellows end of thermostat is screwed in for lower temperatures, out for higher temperatures. Choke screw on end of valve is adjusted to suit normal condensate flow. Plug on side permits check on operation. After initial adjustments for temperature and flow are made, the control is automatic in action, opening to discharge condensate when temperature of liquid falls a few degrees below point desired and closing when sufficient steam has been admitted to heating coil to re-establish operating temperature.

Thermostat bulb (3) may be clamped t outside of heater shell but is usually inserted



in sleeve (4) which projects into water space in tank. The sleeve is screwed into ½ in. connection on tank wall or fastened in place by lock nut and lead washers (5). Bulb is locked into sleeve by split nut (6).

MADE BY—*Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.*

Delco-Heat Conditionair

NAME AND MODEL NUMBER — Delco-Heat Conditionair air conditioner, models GA_2 and DA_2.

PURPOSE—Supply warmed air using gas as a fuel.

FEATURES—The DA_2 model is like the GA_2 model except that the refractory is omitted in the GA_2 and the burners are somewhat different.

MADE BY—*Delco Appliance Corp., Rochester, N. Y.*

National Oil Heating Boiler

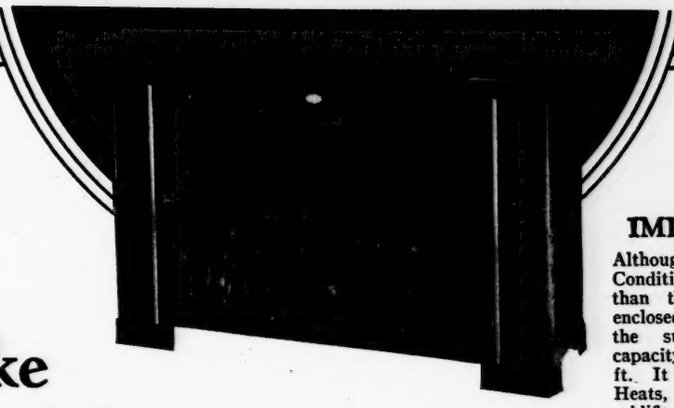
NAME AND MODEL NUMBER—National Series 018 jacketed cast iron oil heating boiler.

PURPOSE—Oil-burning boiler for supplying steam or hot water.

FEATURES—Boiler is of cast iron construction with 42-in. waterline carried through the top nipple ports. Extended heating surface, in the form of fins, is provided on the crown, waterlegs, and flue chambers of the section. Back section of boiler is flanged to accommodate either of two sizes of storage type, built-in, hot water coils or an instantaneous type coil heater. Boiler has a relief bypass to aid in maintaining uniform conditions in the combustion chamber, to relieve back pressures in starting, and aid in overcoming reverberation.

SIZES AND CAPACITIES—Six sizes, ranging from 335 to 720 sq. ft. of steam radiator surface.

MADE BY — *National Radiator Corp., 221 Central Ave., Johnstown, Pa.*



IMPORTANT

Although this Unit Air Conditioner is no larger than the usual cabinet enclosed radiator it has the surprising heating capacity of over 80 sq. ft. It does five things—Heats, filter cleans, humidifies and circulates the air. Also, takes deadness out of air in Summer by keeping it freely moving.

How To Take The Muffler Off Your Cash Register During These Slack Winter Months

EVERY job of radiator heat, whether water or steam, that you have ever installed, is a ready-waiting money-making prospect for you. Every job you have installed, and every one that anyone else has, for that matter. It is open season when it comes to this Unit Air Conditioner of ours.

You go to one of your jobs—new or old—and sell them a Conditioner for say, their living room. It will take the place of an existing radiator.

Takes up no more room than the average grille-enclosed radiator. Stands only 21 inches high.

No duct work. No tinsmithing. No registers or wall grilles to cut opening for. You simply take out a radiator, slip the Conditioner in its place, connect up with the existing piping and do a little wiring. That's no work at all. You can do one a day easily.

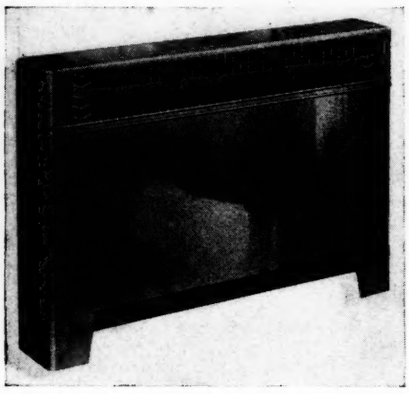
So much then for the high-spots. If you want to get your hands on some of this Wintertime cash-ringing money, better send at once for printed matter, prices and all particulars so that you can get-going a jump ahead of the other fellow.

Always there's that other fellow.

Burnham Boiler Corporation

IRVINGTON, NEW YORK ZANESVILLE, OHIO

Representatives in All Principal Cities of the United States and Canada



Modine Copper Convector

NAME—Modine copper convector.

FEATURES—Available in a new line designed for improved appearance by a furniture stylist. A wide selection of grille design is available to architects who wish to make up their own patterns to harmonize with the building interior. Various shades and tones are available in the enclosures. Rounded corners are used. To protect corners of the heating element, cornice strips are metallically bonded to the fins on the top, bottom, and on both sides. Unit is said to provide greater heating capacity than the old model, size for size. Company announces a new catalog on this line now available in which considerable space is devoted to the use of this product with air conditioning.

MADE BY—*Modine Manufacturing Co., Racine, Wis.*

Stay-Rite Boiler Cleaner

NAME—Stay-Rite boiler cleaner.

PURPOSE—To remove oil and impurities present in new heating plants and in old systems when they have become clogged. Also said to stop priming and foaming.

MADE BY—*Stay-Rite Co., Inc., Cleveland, Ohio.*

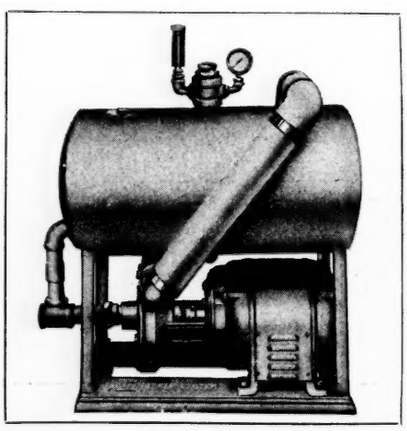
Adsco-Becker Condensate Return Unit

NAME—Adsco-Becker condensate and steam return system.

PURPOSE—Returning steam and condensate to the boiler at high temperatures in applications in industrial plants and buildings where process work is carried on.

FEATURES—The device is one piece of equipment, motor driven with one moving part.

MADE BY — *American District Steam Co., North Tonawanda, N. Y., east of the Mississippi and by the Becker Pump Co., Oakland, Calif., in the West.*



Carrier Air Conditioners

NAME AND MODEL NUMBER — Carrier Home Air Conditioners.

PURPOSE—Winter or year round air conditioning utilizing either oil or gas.

FEATURES—Throw-away type filters for air cleaning; evaporative pan type humidifier with complete remote control for humidifying; forward curved blade fan for air moving; fin type coils for heating. When summer cooling is desired a fin type cooling coil can be installed. Oil burner is of the gun type with spark ignition. The air conditioner is made up of two units—the furnace and air conditioning unit. The air conditioning unit is placed on top of the furnace to decrease the amount of floor space required. An 18 gage steel jacket with crackle enamel finish is used to house the units.

SIZES AND CAPACITIES—Oil fired—190,000 and 323,000 B.t.u. per hr. Gas fired—150,000 and 260,000 B.t.u. per hr.

MADE BY — *Carrier Engineering Corp., 850 Frelinghuysen Ave., Newark, N. J.*

Armstrong Forged Steel Trap

NAME AND MODEL NUMBER—Armstrong forged steel trap, No. 312.

PURPOSE—A small relatively low-priced trap for high-pressure drips up to 450 lb. gage.

FEATURES—The trap uses the Armstrong inverted bucket and free floating lever operating principles. There are only two moving parts, the bucket and the valve lever assembly.

The complete interior mechanism is made up of stainless steel and the valves and seats are heat treated for maximum hardness and toughness. Trap weighs approximately 30 lb. and is 10¼ in. in height and 6¾ in. in diameter.

SIZES AND CAPACITIES—Trap is provided with either ½ in. or ¾ in. screwed or flanged connections. The 450-lb. operating pressure trap has a continuous discharge capacity of approximately 2500 lb. of hot condensate per hour.

MADE BY—*Armstrong Machine Works, 746 Maple St., Three Rivers, Mich.*

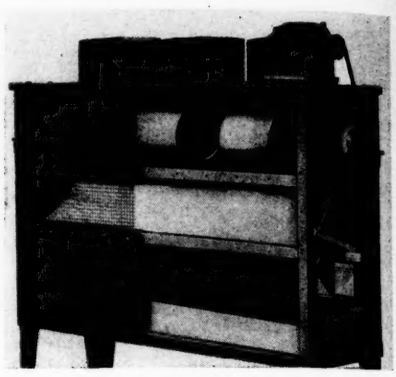
Perfex Unit Heaters

NAME—Perfex unit heaters.

FEATURES—The construction provides cross-flow circulation. The supply header and return header are integrally cast in one unit. The condenser is composed of a series of round copper tubes, formed into U shape, which extends in parallel rows from the header casting. The free ends of the U-shaped tubes are supported by a steel spacer channel which is said to permit free expansion and contraction without strain. In the new design, the pipe connections are concealed within the back of the unit heater.

SIZES—Units are available in a wide range of sizes and styles.

MADE BY—*Perfex Radiator Co., Milwaukee, Wis.*



Young Unit Heaters, Model FH

NAME AND MODEL NUMBER—Model FH unit heaters.

FEATURES—Made for floor, vertical wall, or horizontal ceiling mountings. Direction of air flow from each nozzle can be governed by changing the position of nozzle on the top panel of the unit heater so that the air can be circulated in three or four directions from the same heater if desired. Casing is of heavy gage steel panels, thoroughly braced and ribbed. Copper extended surface heating element. Tubes are rolled into one-piece, nickel alloy, cast iron header tanks. Heating element is designed for working pressures up to 200 lb. per sq. in.

Blowers are mounted on heavy shaft and driven by ball bearing motor through V-belt drive. Motor mounted on adjustable bracket to regulate belt tension. Can be equipped with Thermadjust dampers, which has the advantage of being able to bypass around the heating element all or any of air being handled. Bypass dampers can be manually controlled or can be furnished to operate with a damper motor thermostatically controlled.

SIZES AND CAPACITIES—Available in 10 models with four sizes of motors for each, giving a range of capacity from 118,700 to 802,000 B.t.u. per hr. when using 2-lb. steam.

MADE BY—*Young Radiator Co., Racine, Wis.*

Pierce Oil-Burning Boiler

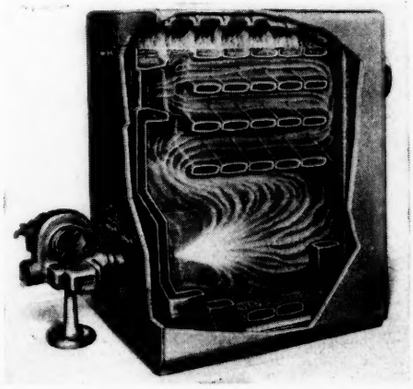
NAME AND MODEL NUMBER—Pierce Oil No. 2.

PURPOSE—For supplying steam or hot water to systems having no more than 3,000 sq. ft. of steam radiator surface, utilizing oil as a fuel.

FEATURES—Boiler is specifically designed for oil burning and has a 5-way heat travel together with a firing chamber, which is completely surrounded by water.

SIZES—For systems having up to 3,000 sq. ft. of steam radiator surface.

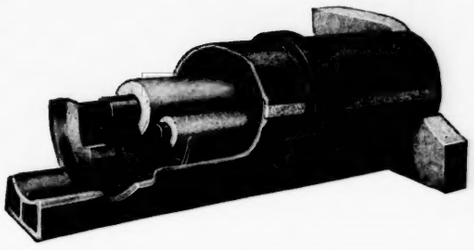
MADE BY—*Pierce Butler Radiator Corp., Syracuse, N. Y.*



ENGINEERED for YEARS of DEPENDABLE DISTRICT STEAM HEATING SERVICE

ADSCO-BANNON TILE CONDUIT

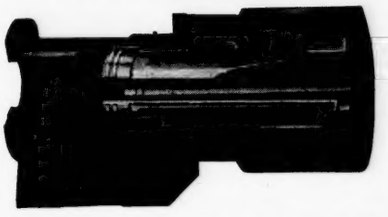
For Underground Steam or Hot Water Pipe Lines



A separable, salt-glazed, vitrified tile conduit, available with or without base drain, for one or more pipes. Combines strength, simplicity, durability and heat insulating efficiency. Easily installed at low labor cost. Easily separated on the job with a clean-cut diagonal fracture. Adaptable to various types of insulation and installation conditions. Every detail of ADSCO-Bannon Tile Conduit has been supervised by ADSCO engineers who have had years of practical experience in heat insulation and conduit construction. Write for Bulletin No. 35-67 illustrating and describing ADSCO-Bannon Tile Conduit.

ADSCO PISTON-RING JOINT

Can be UNPACKED and REPACKED Under FULL OPERATING CONDITIONS



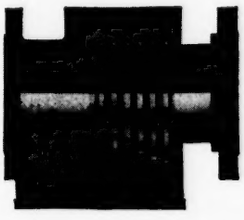
No interruption to service. Piston rings hold the line pressure during repacking operation. Available for high pressures and high temperatures. Write for Bulletin No. 35-15.

ADSCO WATER HEATERS

Instantaneous, Storage and Special Heaters in the Copper U-Tube Type

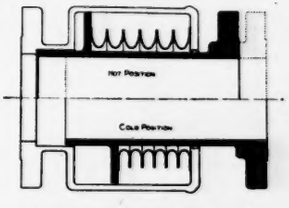
ADSCO Water Heaters are made in any size and capacity of Storage, Instantaneous and Special Types with welded or riveted steel tanks or semi-steel shells with copper U-tube heating elements to 125 lbs. W.S.P. to suit individual operating conditions. Write for Bulletins Nos. 35-75A and 35-76.

ADSCO PACKLESS EXPANSION JOINT, U-RING TYPE



Sectional View of the ADSCO U-Ring Joint

A compact, fully guided, packless expansion joint with steel body and fully enclosed expansion element for high pressures and high temperatures. Requires no servicing. Expansion element is a series of welded U-rings of stainless alloy steel for any reasonable traverse of 1 inch or more. Available with or without anchor base in sizes from 3" to 12". Particularly adaptable to steam lines in conduits where manholes cannot be used or in inaccessible locations where space is limited. Write for Bulletin No. 35-50.



Upper half—Element in Hot Position. Lower half —Element in Cold Position

ADSCO Products also include other types of Slip and Packless Expansion Joints; Condensation and Steam Flow Meters; Steam Traps; Wood Casing; Pipe Supports, Saddle Plates, Alignment Guides; Flanged Fittings, Manhole Frames and Covers.

WRITE FOR ADSCO CATALOG NO. 35HV.

AMERICAN DISTRICT STEAM COMPANY

NORTH TONAWANDA, N.Y.

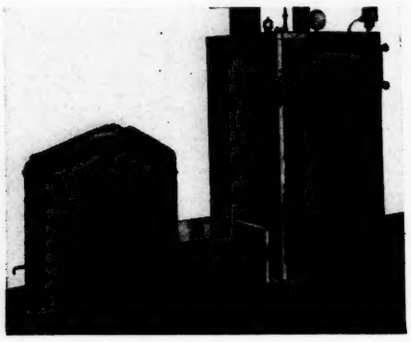
OVER FIFTY YEARS IN BUSINESS

FireTender-Arco Stoker-Boiler Unit

NAME—FireTender-Arco stoker-boiler unit.

PURPOSE—For supplying steam or hot water, utilizing coal as a fuel.

FEATURES—The unit is compact and modern in design and all interior parts are concealed within a lustrous red enameled jacket.



A built-in water heater furnishes hot water throughout the winter and summer. During the summer an automatic clock control feeds only enough coal to heat the water and keep the basement dry.

MADE BY—*American Radiator Co., 40 W. 40th St., New York, and Holcomb & Hoke Mfg. Co., Indianapolis, Ind.*

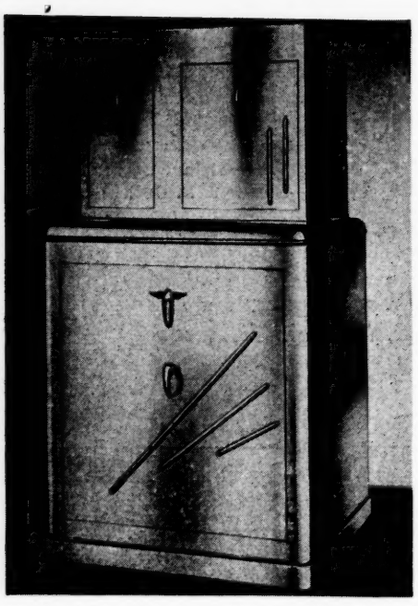
Janitrol Winter Air Conditioners

NAME AND MODEL NUMBER — Janitrol conditioners, types CF and CA.

PURPOSE—For winter air conditioning.

FEATURES—The CF model has a new cabinet which hides all supply lines. Two glass wool filters, a humidifier, gas burner and heater surface are enclosed within the cabinet. See illustration. The burner is designed so that the gas burns with a short flame and shuts off quietly. Heat exchange is secured by a series of copper rods with a multiplicity of fins. The humidifier is of the refractory plate type with four large evaporating surfaces. The CA line of conditioners differs chiefly from the CF line in the heat exchangers and humidifiers. The heat exchangers, of which there are two, are of heavy steel plate with staggered baffles. Humidifier is of the pan type.

MADE BY—*Surface Combustion Corp., Toledo, Ohio.*



National Radiator Steel Boiler

NAME—National Premier oil heating, jacketed, vertical steel boiler.

PURPOSE—To supply steam or hot water, utilizing oil as a fuel.

FEATURES—Gases from the vertical circular combustion chamber pass through a series of short tubes to a front chamber and then through a longer series to the smokebox. Turbulators are installed in each tube to cause the gases to swirl, increasing the scrubbing effect. Three sizes of built-in copper coils can be furnished for supplying domestic hot water—two sizes for storage systems and one for instantaneous systems. Other built-in equipment includes low water cutoff, an observation port, automatic draft adjuster, and aquastat tappings. Heavy air cell insulation surrounds the boiler. Boilers are furnished with either a standard jacket or with a front extension to enclose gun type burners and other controls. It is also said that the boilers are well adapted for use with stokers.

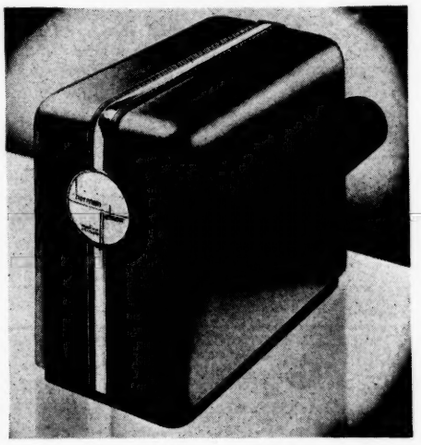
SIZES AND CAPACITIES—Two sizes with steam ratings of 540 and 680 sq. ft.

MADE BY—*National Radiator Corp., 221 Central Ave., Johnston, Pa.*

Nelson Oil Burner

NAME—Conversion oil burner.

FEATURES—Of gun or pressure type, streamlined. Said to be unusually compact and efficient. Burns from 1.35 to 4 gal. of No. 3 oil per hr.. 1/6-hp. motor, 1,725 r.p.m.



MADE BY — *The Herman Nelson Corp., Moline, Ill.*

American Radiator Vent Valves

NAME—Variport Airid, Variport Vacuum and Arco Hurivent.

PURPOSE—Variport Airid radiator valve is for installation on one-pipe steam systems; the Variport Vacuum is for installation on vacuum systems. Both of these valves have an adjustable vent port for balancing the distribution of steam throughout the system. Arco Hurivent is used for rapid venting of steam mains.

MADE BY—*American Radiator Co., 40 West 40 St., New York.*

Hubbard Conditioner

NAME—Air conditioning unit.

FEATURES—Combination economizer and conditioner. Uses waste heat from central heating plant. Filters, heats, humidifies, and washes air passed through the unit. Moisture introduced through water jet. Motor driven.

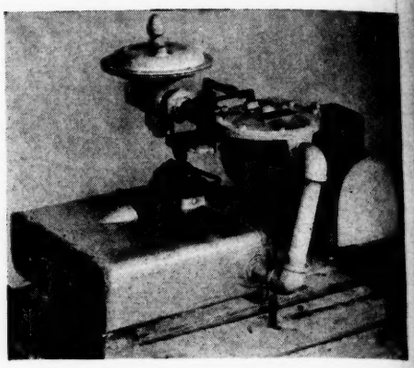
MADE BY—*The Hubbard Co., Minneapolis.*

Lo-Blast Gas Conversion Burner

NAME—Lo-Blast gas conversion burner.

PURPOSE—Applications to down-draft or revertible flue type boilers or furnaces.

FEATURES—Of cast iron construction.



Working parts outside of the furnace. Said to have no intricate refractories. Has gas-actuated control valve. Burner and pilot safety element are protected from reflected heat. Slow speed motor is resiliently mounted, and air is delivered at low pressures so that unit is said to operate silently. Electrical consumption 47 watts.

SIZES AND CAPACITIES—A range of sizes with capacities from 100,000 to 4,500,000 B.t.u. per hr.

MADE BY—*National Machine Works, Peoples Gas Bldg., Chicago.*

Electric Unit Heater

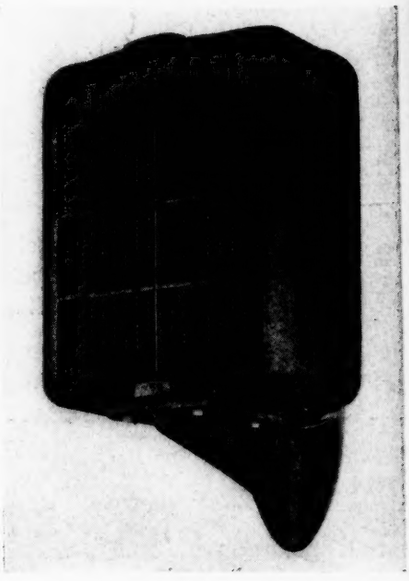
NAME—Hexcel All-Electric unit heater.

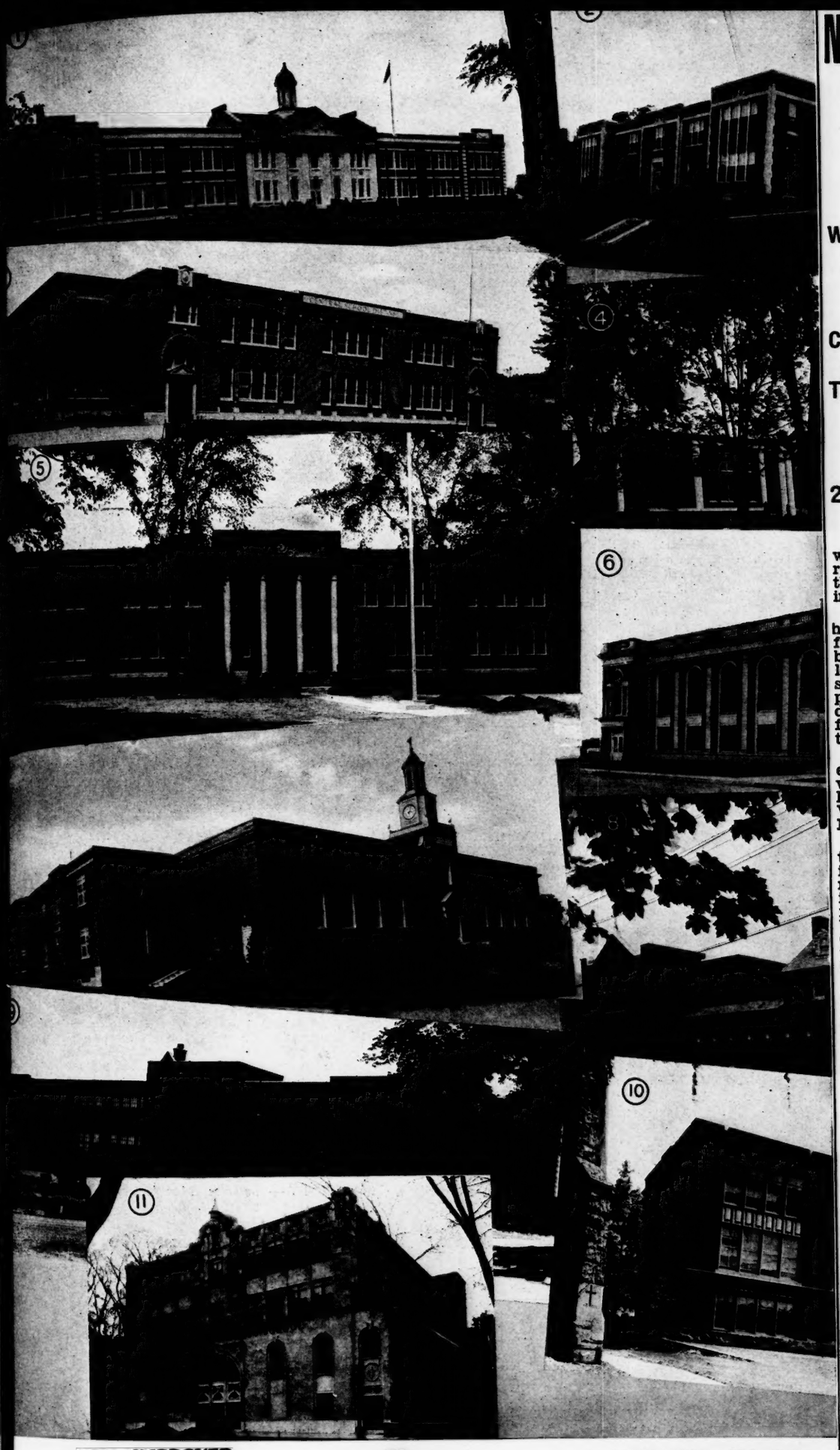
PURPOSE—Electric unit heater suitable for garages, service stations, offices, and other buildings.

FEATURES—Dual heat control. High heat for quickly heating up an area and low heat for maintaining the temperature. Unit has an all-copper core with cast top and bottom tanks with electric immersion type heating elements enclosed in the bottom tank. Heats a non-freezing liquid to a temperature of 180F. Unit is completely sealed.

SIZES AND CAPACITIES—High heat, 6,000 watts; low heat, 3,500 watts, with air output of 250 c.f.m.

MADE BY—*Hexcel Radiator Co., Racine, Wis.*





NEW YORK STATE SCHOOLS ENJOY MODERN HEATING

Webster Hylo Systems Give Excellent Results in Upstate Schools

COMFORT IN ZERO WEATHER

Throttling Type of Control Checks Overheating and Reduces Steam Costs

2 TO 5 YEARS OPERATION

Albany, N. Y.—The picturesque wood range, which heated the little red school house, is a far cry from the efficient central heating systems in schools of today.

But despite vast improvements in heating methods, school officials have found that well-regulated, carefully balanced heating cannot safely be left to chance. The modern heating system must meet class-room temperature requirements day in and day out, it must be relatively free from trouble, and it must be simple to operate and, above all, economical.

This is the heating record of eleven upper New York State schools within 50 miles of Albany where heating needs are being met by the Webster Hylo System of Steam Heating.

These 11 schools, located in a section of New York State noted for its severe winters, have enjoyed economical heating service, comfortable indoor temperatures and minimum repair and maintenance bills with Webster Hylo Systems. Webster Control has been in operation in these schools for periods ranging between two and five years.

With the Webster Hylo System, heat loss is reduced to a minimum. If the outdoor temperature is 35 degrees, the operator adjusts the weights on the Webster Hylo Variator at 50 per cent. Direct radiators are then kept approximately half filled. During all periods of mild weather, the radiators are partially filled with steam. This throttling type of control is achieved with Webster's simple, rugged, conveniently located Variator valve.

School officials have come to value the service of the Webster Organization. Webster engineers study each installation carefully, make adjustments to meet particular conditions involved, and stay on the job until the installations are operating at maximum efficiency.

Eleven of the upper New York State schools heated by Webster Hylo System are illustrated here and can be identified by number as follows: (1) Central School, Greenville; (2) Central School, Westport; (3) Central School District No. 1, Averill Park; (4) Central School, Schoharie; (5) Lewis Rutherford Morris Central School, Morris; (6) Central District School, Broadalbin; (7) Central School District No. 1, West Winfield; (8) Blessed Sacrament School, Utica; (9) St. Agnes School, Loudonville; (10) Grade School No. 1, Mechanicsville; (11) St. Francis de Sales School, Utica.

If you are interested in heating *new* buildings, or in improved heating service and lower heating cost in your present building, address

WARREN WEBSTER & CO., Camden, N. J.
Pioneers of the Vacuum System of Steam Heating
Branches in 60 principal U. S. Cities—Estab. 1888

IMPROVED
Webster
Systems of
Steam Heating

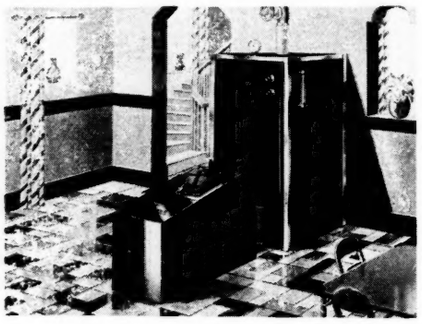
The Webster Hylo Steam Variator—a simple, rugged central control—regulates the heating of 11 New York State school buildings shown on this page. The Hylo Steam Variator (illustrated) automatically throttles a rugged motor-operated valve in the steam main.

Anchor-Arco Stoker Boiler

NAME AND MODEL NUMBER — Anchor-Arco Kolstoker Boiler unit.

PURPOSE — Combination coal stoker and boiler.

FEATURES—Manufacturers claim a high efficiency for this unit due to the fact that the automatic coal burner has been installed in boiler designed and built especially for the requirements of automatic coal firing. The unit is finished in bright red and black.



MADE BY—*American Radiator Co., 40 West 40 St., New York, and Anchor Stove and Range Co., New Albany, Ind.*

Anderson Combination Trap

NAME—Super-Silvertop combination thermostatic and inverted bucket trap.

PURPOSE—To completely remove air and condensate from steam systems even at extremely low pressures.

FEATURES—Manufacturer states that in these traps, air is bypassed around the water seal and therefore slight pressure differentials are sufficient for operation. The entrained air causes the bellows to contract, opening a bypass and allowing the air to pass directly to the return line without going through the water seal. The trap has a valve and seat made of Anderloy. It is said that the return line can be run higher when this trap is used since both the inlet and outlet of the trap are in the head. Traps can be used on systems with pressures from a fraction of an ounce up to 50 lb.

SIZES AND CAPACITIES—Available with pipe connections up to 1¼ in. and with capacities up to 10,200 lb. at 15 lb. pressure.

LITERATURE AVAILABLE—Bulletin No. 1036.

MADE BY—*The V. D. Anderson Co., 1935 W. 96th St., Cleveland, Ohio.*

Electromode Bathroom Convector

NAME—Electromode convection heaters.

PURPOSE—Electric heater especially intended for chilly bathrooms, as temperature booster in rooms hard to heat.

FEATURES—Element of cast aluminum. Heating is by means of a calrod, around which the element is poured. Shrinking of the metal in cooling causes calrod to become an integral part of the heating element.

SIZES AND CAPACITIES—A ¾-kw. unit.

MADE BY—*The Electric Air Heater Co., 555 Byrkit St., Mishawaka, Ind.*

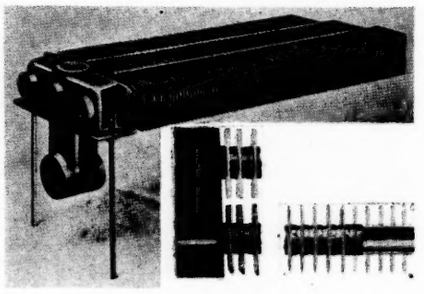
Grinnell Thermofin Convector

NAME—Thermofin convector.

PURPOSE—Concealed and cabinet type room heaters.

FEATURES—Available in two types, Simplex and Duplex, the former for single pipe steam heating, the latter for two pipe systems, either steam or water. The Simplex unit has a connection whereby steam travels up a loop to the free end of the convector where the steam enters the heater proper, so that the steam and water are always flowing in the same direction through the convector. The Duplex type has two headers of the drop-ell pattern which can be reversed for downfeed connections or arranged in other combinations to best suit the particular system.

Element of Simplex Thermofin for one-pipe steam system.



Element of Duplex Thermofin for two-pipe system.

SIZES AND CAPACITIES—Available in a wide range of widths, depths, and lengths in cabinets ranging from 18 to 30 in. wide.

MADE BY—*Grinnell, Inc., Providence, R. I.*

Capitol Oil-Burning Boiler

NAME AND MODEL NUMBER—US-20 oil-burning boiler.

PURPOSE—Oil-burning boilers for supplying steam or hot water.

FEATURES—Special type of surface for increasing the absorption of heat from gases. Has a special burner compartment.

SIZES AND CAPACITIES—Four sizes, ranging from 290 to 663 sq. ft. of steam heat surface.

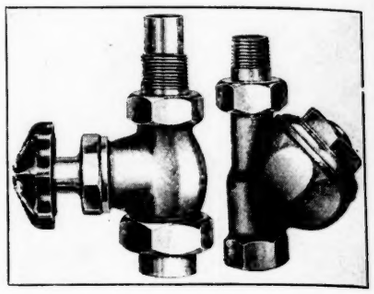
MADE BY—*United States Radiator Corp., 44 Cadillac Sq., Detroit, Mich.*

Marsh Vertical Valves and Traps

NAME — Marsh vertical packless radiator valves and thermostatic traps.

PURPOSE—Especially designed for installation with concealed or cabinet type radiators.

FEATURES—The radiator globe valve is designed for use on steam, vapor, or hot water systems where a vertical or straightway connection can be used. It embodies the same all-metal packless construction feature which is standard on other valves of this company. The double union feature allows for simple installation in the closest connection. The extended tailpiece, a special feature for bottom connected radiators, extends into the radiator and prevents the accumulation and return of condensation through the supply valve.



The vertical trap has a thermostatic element which is identical with those used in the Marsh No. 1 traps and is interchangeable with them. It is said that the trap is non-freezing because of the perfect drainage of condensation from the body. The cap is removable without disconnecting the body from the piping connections.

SIZES — Valves and traps are available in ¾-in., 1 in., and 1¼ in. pipe sizes.

LITERATURE AVAILABLE—Form No. 536.

MADE BY—*Jas. P. Marsh Corp., 2073 Southport Ave., Chicago, Ill.*

Airvector Unit Heater

NAME—Airvector unit heater.

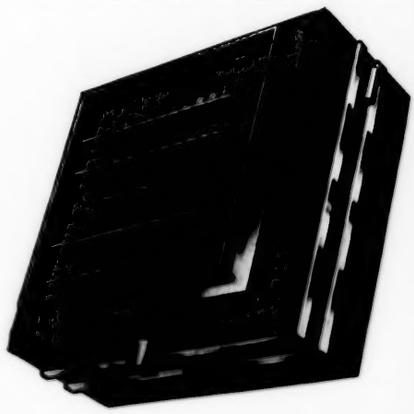
PURPOSE—For space heating.

FEATURES—Exclusive features claimed for this unit heater include a new method of motor mounting which is said to eliminate swinging or "pendulum" action of the unit caused by motor vibration; the forming of two vertical ribs around the cabinet which increases the strength and at the same time has a deadening action on the vibration of the cabinet panels; welded construction wherever practicable.

SIZES—A full range of unit heater capacities is available.

LITERATURE AVAILABLE—Catalog No. P-7 contains complete details.

MADE BY — *Airtherm Manufacturing Co., 1474 S. Vandeventer, St. Louis, Mo.*



Summer Cooling Up 6.3% in 1936

IN keeping with the prevailing attitude of the industry, the point of view in this section is that the summer functions consist of either cooling air or dehumidifying it, or both. A summer plant is therefore considered to be one which is capable of cooling or dehumidification or both. The summer plant may also perform other functions and frequently does do so, but it is common practice to put emphasis on cooling or dehumidification when considering the summer phase of the subject.

Much took place during 1936 and just what part of these happenings and developments really can be considered as contributing to progress is questionable. What seems like progress does not always finally turn out to be such. The aim here is to attempt to give as broad a summary as space will permit and space limitations have necessarily ruled out some points which doubtless did add to the year's accomplishments. As in the preceding sections the plan is to turn attention first to commercial aspects of the subject and then to review the engineering and technical phases so far as a short-term view will permit.

Statistics

The statistical situation is not well enough developed to permit anything approaching a full analysis. The figures which are available still have to be gathered by main strength and persistence. It is notable that during the year two developments took place which will shortly place the statistical material on a better basis. The electric utility trade association moved to standardize, collect, and publish the reports of the activities of its members, and the Department of Commerce started reporting the sales figures of manufacturers on an improved and expanded basis.

The installed value of summer air conditioning in 1936, based on reports from 40 electric utilities, increased 6.3% as compared with 1935, while the number of installations is estimated to have increased 44.2%. Table 5 shows detailed figures for territories covered by the reporting utilities. In most cases these reports cover 10 months of 1936 and not the entire year, but the first 10 months usually account for practically all of the business.

The greatest increase was shown in commercial buildings, while the reports indicate that industrial work fell off. Public and institutional air conditioning increased, a gain approaching 1934 levels and it is believed that final and complete reports will still further swell this total since some large jobs in Washington have not yet been connected to the lines of the utility and these figures do not appear in the totals.

Table 1 shows how the summer air conditioning business divided up during 1936 as compared with 1935.

Table 2 is interesting in that it shows the reports as totaled for cities of various population groups.

The greatest percentage increase is thus shown to be taking place in smaller cities while the larger cities actually show a decline in load connected during the year. The *number* of jobs, however, increased in all groups as shown in the table.

TABLE 1.—SUMMER AIR CONDITIONING BY BUILDING TYPE

Type of Building	1936		1935	
	No.	Hp.	No.	Hp.
Commercial	65.5%	74.0%	64.2%	67.4%
Industrial	2.8	5.6	5.7	16.8
Theater and Recreational	4.0	8.9	6.4	10.3
Public and Institutional	2.0	9.6	4.9	4.3
Residential	25.7	1.9	18.8	1.2
Total	100.0%	100.0%	100.0%	100.0%

The following comments dealing with specific cities are also of interest:

Chicago reports that the significant point in the 1936 business is the rapid increase in residential, private office and general office installations. It should be added also that Chicago now has more than 200 air conditioned restaurants.

Table 3 is of value in that it shows the breakdown by size of jobs added during 1936 to the lines of the New York Edison Company which serves the boroughs of Manhattan and Bronx.

TABLE 2.—SUMMER AIR CONDITIONING BY SIZE OF CITY

Population Group	Increase, %	
	No.	Hp.
4 cities over 1,000,000 population	+ 40.0	— 4.7
6 cities between 500,000 and 1,000,000	+ 48.3	+ 4.5
30 cities less than 500,000	+ 45.8	+ 17.4

The Dallas, Tex., figures as reported are somewhat swollen due to the fact that of the 4093 hp. installed, 2148 hp. were provided for the Centennial Exposition.

There are now over 8000 railroad cars cooled of which somewhat over 2000 were equipped during 1936. This total compares with slightly less than 3400 conditioned during 1935, indicating that perhaps the point is fast being reached where the railroads will have all of those cars cooled which they feel it will be profitable to cool. The breakdown by type of plant built in 1936 and 1935 is shown in Table 4.

Of the 8031 cars now conditioned, 3907 are railroad-owned cars and the remaining 4124 are Pullman-owned.

It will be noted from Table 4 that the number of newly cooled cars using ice dropped off less than either mechanical or steam.

TABLE 3.—SUMMER AIR CONDITIONING SYSTEMS INSTALLED BY SIZE OF JOB, NEW YORK CITY, 1936

Size, Hp.	No. of Jobs	Horsepower
Less then 10	78	500
11 to 20	56	910
Over 21	94	5434

Anchor-Arco Stoker Boiler

NAME AND MODEL NUMBER — Anchor-Arco Kolstoker Boiler unit.

PURPOSE — Combination coal stoker and boiler.

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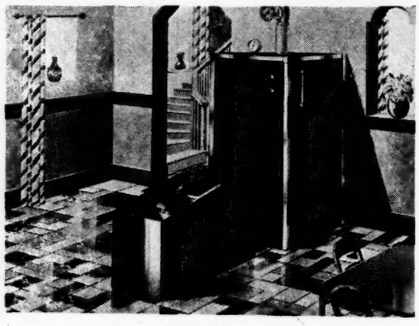

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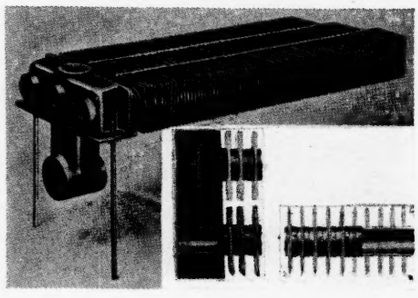

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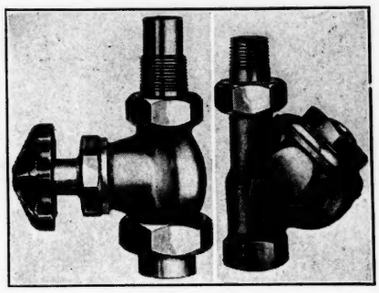

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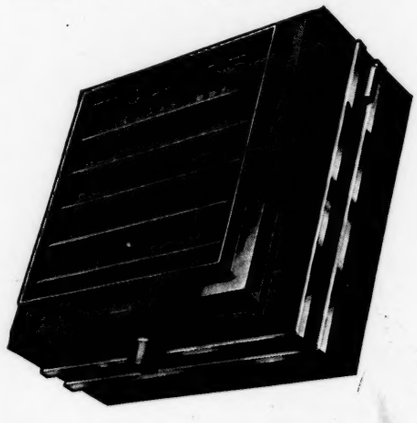
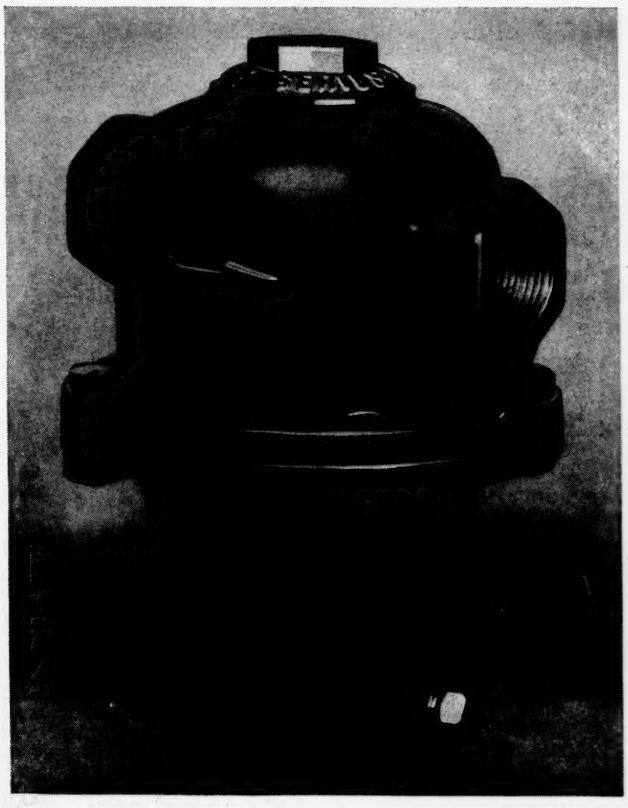


For Highest
RADIATOR EFFICIENCY
and for
LOWEST RETURN LINE TEMPERATURES

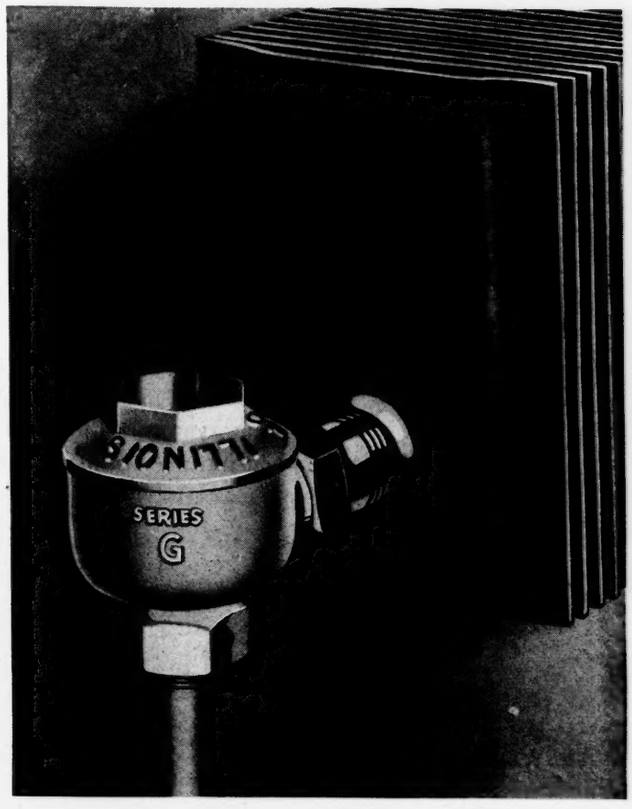
ILLINOIS

Series G Traps

Thermostatic Traps on all direct radiation . . .
Float and Thermostatic Traps on Unit Heaters,
Unit Ventilators and on drip points.



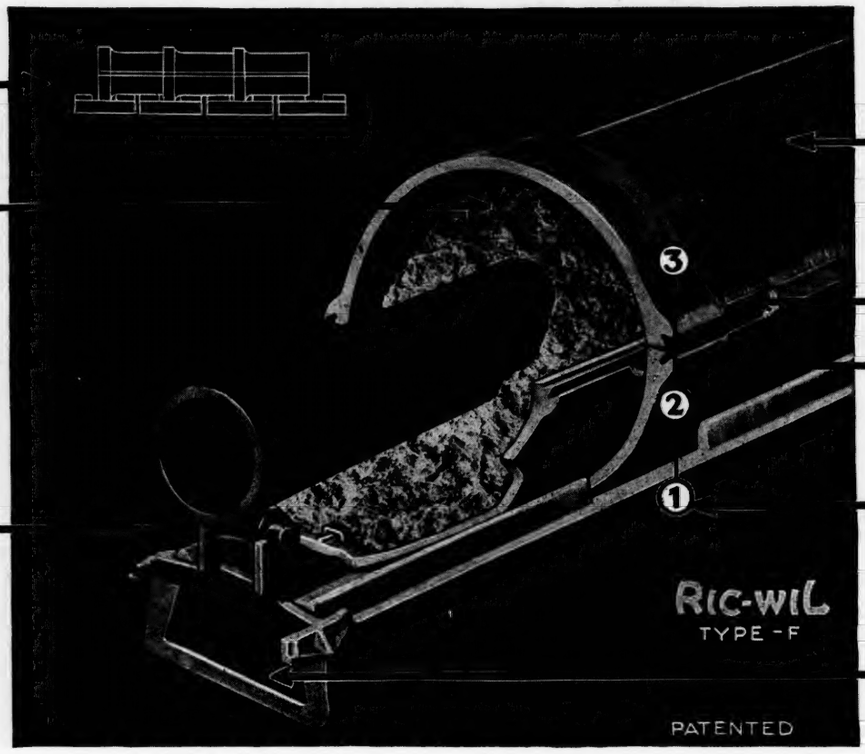
ILLINOIS Series G
Float and Thermostatic Traps



ILLINOIS Series G
Thermostatic Traps

INVESTIGATE THEIR PERFORMANCE RECORDS

ILLINOIS ENGINEERING COMPANY
ROB'T L. GIFFORD, PRES. INCORPORATED 1900
BRANCHES AND REPRESENTATIVES IN 40 CITIES
CHICAGO



- Interlocking Construction — *Stability*
- Famous Ric-wiL Dry-paC Waterproof Asbestos Insulation — *High Efficiency*
- Practical Supports For Pipes Snap In Place — *Speed*
- Best Vitrified Glazed Tile — *Everlasting Waterproof*
- Famous Loc-liP Joint Continuous Visible — *Practical*
- Old Reliable Bell Joint — *Positive*
- Only Three Pieces To Handle For Two Feet Of System Only Three Joints — *Low Cost*
- Base Drain Foundation Non-Settling Ample Drainage — *Substantial*

Engineered and Built to be a PERMANENT GUARDIAN *of Your* STEAM

ANALYZE Ric-wiL Underground Conduit. Compare it, point for point, with other systems. Careful, competent *engineering* is the answer to Ric-wiL's quarter-century record of success. Water repellence, heat retention, underdrainage, alignment, ease of assembly—all these cardinal requirements have been adequately, permanently provided for. The result is an underground steam system which is almost invariably the *first choice* of engineers who have made a special study of this type of construction. Ric-wiL is the one *definite* and *economical* answer to the problem of underground heat loss!

Varied designs in both standard weight Tile and Super Tile, in Cast Iron, and in Armco Iron Unit Steam Main. Famous Dry-paC Waterproof Asbestos Insulation (90+% efficient)—other insulations optional. Ric-wiL offers a comprehensive service, adequate to any problem in the field of underground steam transmission. Ric-wiL Systems are complete, including materials, installation instructions, and engineering service drawings—also field supervision and tests, if desired. Find out what Ric-wiL has done for others!

Submit your heat or power transmission problem to Ric-wiL engineers! Catalog promptly on request.

1937 Steam Heating Rates Bulletin NOW READY

Ask for it

RIC-WIL UNDERGROUND CONDUIT *for Steam Lines*

The Ric-wiL Company
Union Trust Bldg.
Cleveland, Ohio

New York
San Francisco
Chicago

Agents in Principal Cities

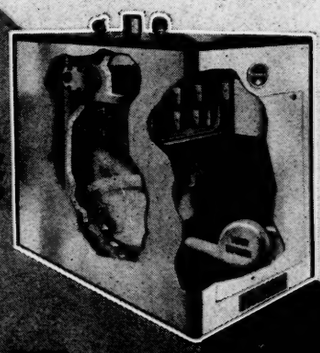
in NEW Smartline Jackets

The SQUARE REGAL Smartline — to completely enclose the boiler and any short burner

Whether selling boots or boats or boilers, *appearance alone often makes or breaks a sale.* With these new jackets . . . trim as the "Zephyr" or a streamlined motor car, and requiring no extra floor space . . . Kewanee Boilers have been given that added eye appeal which speeds up sales.

But proud as any maker might well be of these new jackets, we still say: "It's **what's <u>under</u> the jacket that counts.**" And under each of them is a healthy heart of steel . . . the sturdy Kewanee "R" which has established such enviable records for economically heating homes and smaller buildings.

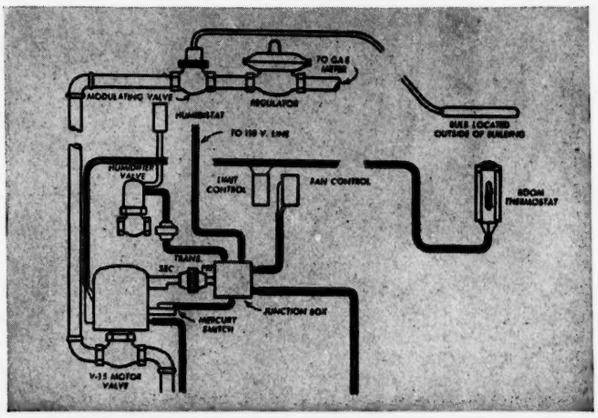
The Round "R" Line has been enlarged to include boilers as small as 400 sq. ft.

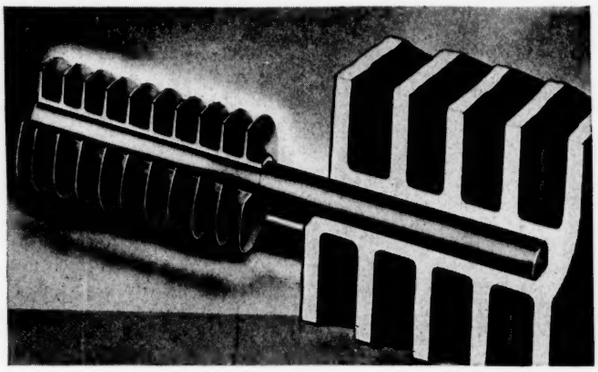


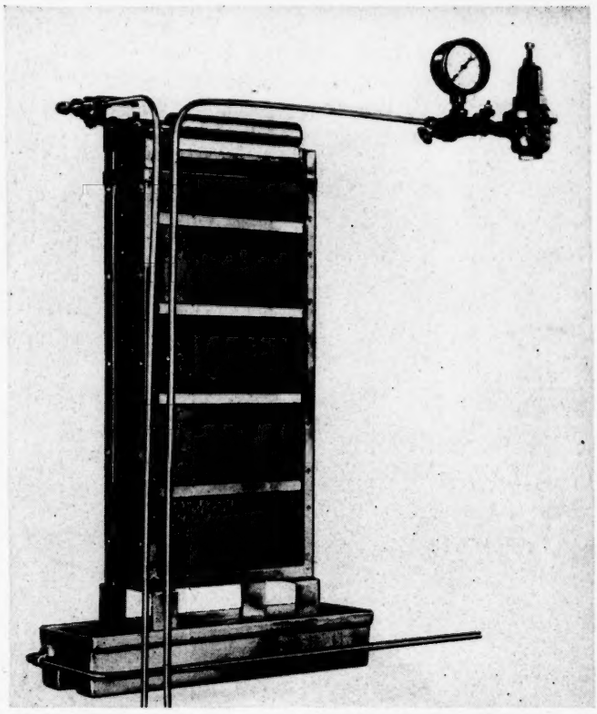
Round KEW EE

STE

ONLY *Janitrol* "CF" CONDITIONER HAS THESE THREE FEATURES







● Sometimes it takes only a single special feature to win a wavering prospect. Often a sale is quickly closed by presenting one final exclusive feature. Here are three of the outstanding features that enable you to close sales of Janitrol WINTER AIR CONDITIONERS. When a customer is sold on completely automatic air conditioning, any one of these three outstanding salable advantages may have the particular appeal that wins the sale for Janitrol. All three together are practically invincible as closing points.

1 The *Janitrol* COMPENSATING SYSTEM OF CONTROL places the room thermostat in charge of both the production and delivery of the heat. A metal bulb is mounted in a metal box outside the house. A compensating valve controls the gas burned as dictated by the outside temperature. A two-speed motor provides for variation in air delivery. Thus Janitrol assures a *greater evenness and accuracy of temperatures* than is possible where motor operation is controlled only in accordance with bonnet temperatures.

2 The *Janitrol* COPPER-ROD-AND-FIN HEAT TRANSFER is a new and exclusive device that has won the applause of heating experts. It is responsible for the remarkable compactness achieved in Janitrol CF. When the hot gases rise inside the heat exchanger, they are broken into fine streams which come in contact with a vast amount of heating surface and produce *enormous heating efficiency within closely confined space.*

3 The *Janitrol* REFRACTORY PLATE HUMIDIFIER assures *ample humidification* under complete automatic control. Absorbent refractory plates fitted into frames notched to admit seepage of water which arrives through pressure regulator, gauge, solenoid valve, self-cleaning discharge nozzle and distribution chamber. The warmed air passes between and around the refractory plates evaporating the water and carrying the perfectly controlled moisture content to every room.

There are big profit returns to be made from concentration on Janitrol's 3 outstanding advantages.

SURFACE COMBUSTION CORPORATION

TOLEDO • OHIO

JANITROL

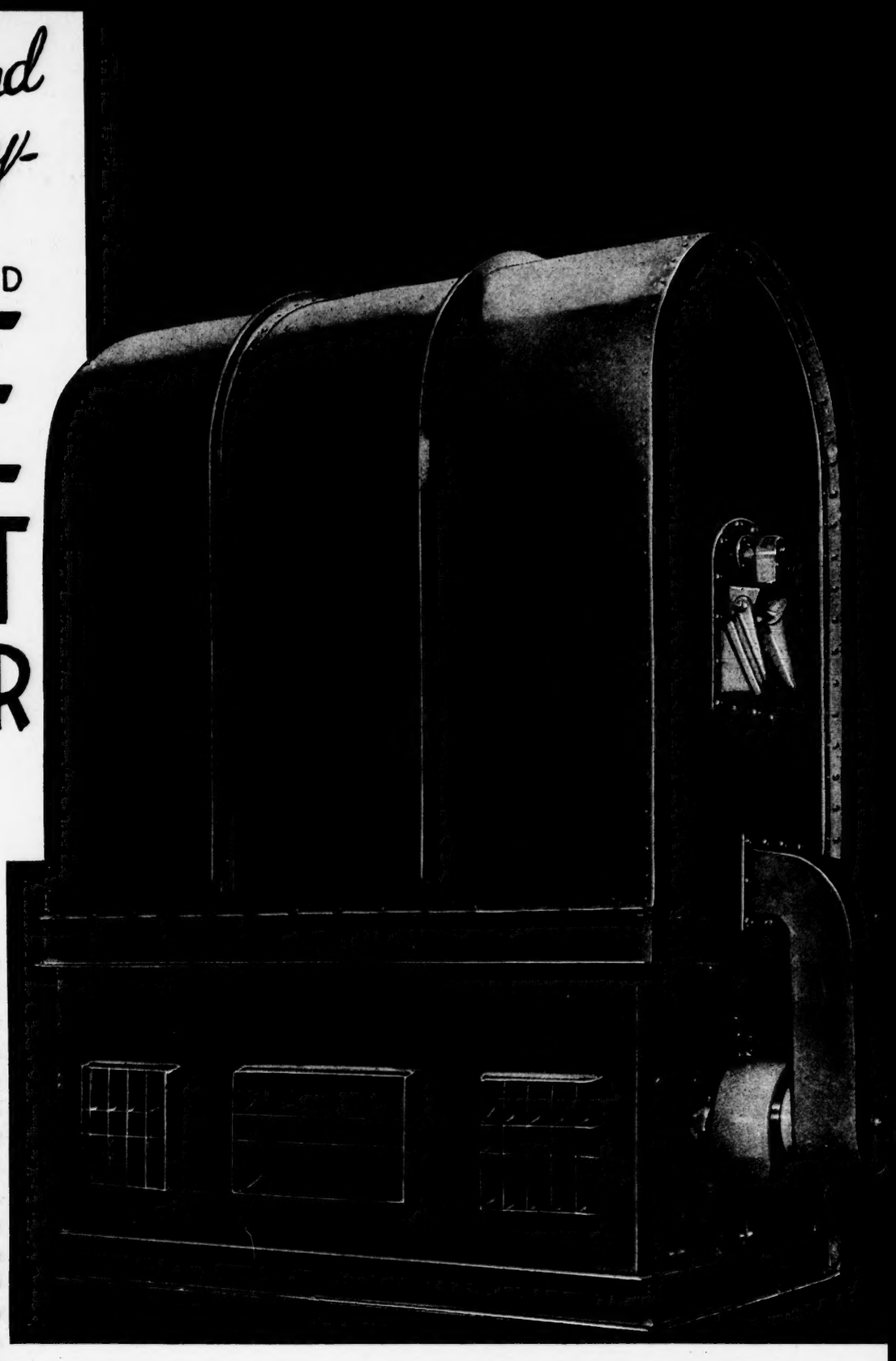
WINTER AIR CONDITIONERS

For all-round Efficiency-

THE DIRECT FIRED

LEE UNIT HEATER

FOR HEATING BUILDINGS



Scientifically designed for firing with oil or gas with unusually high efficiency. Design is such that high output can be obtained in an unusually compact space. Space required for a unit good for an output of 1,000,000 B.T.U.'s per hr. 5' x 11' x 10' high. This size unit takes 12,000 CFM fan capacity powered by a 5 H. P. motor and will heat a space of approximately 250,000 cu. ft., depending on construction of building.

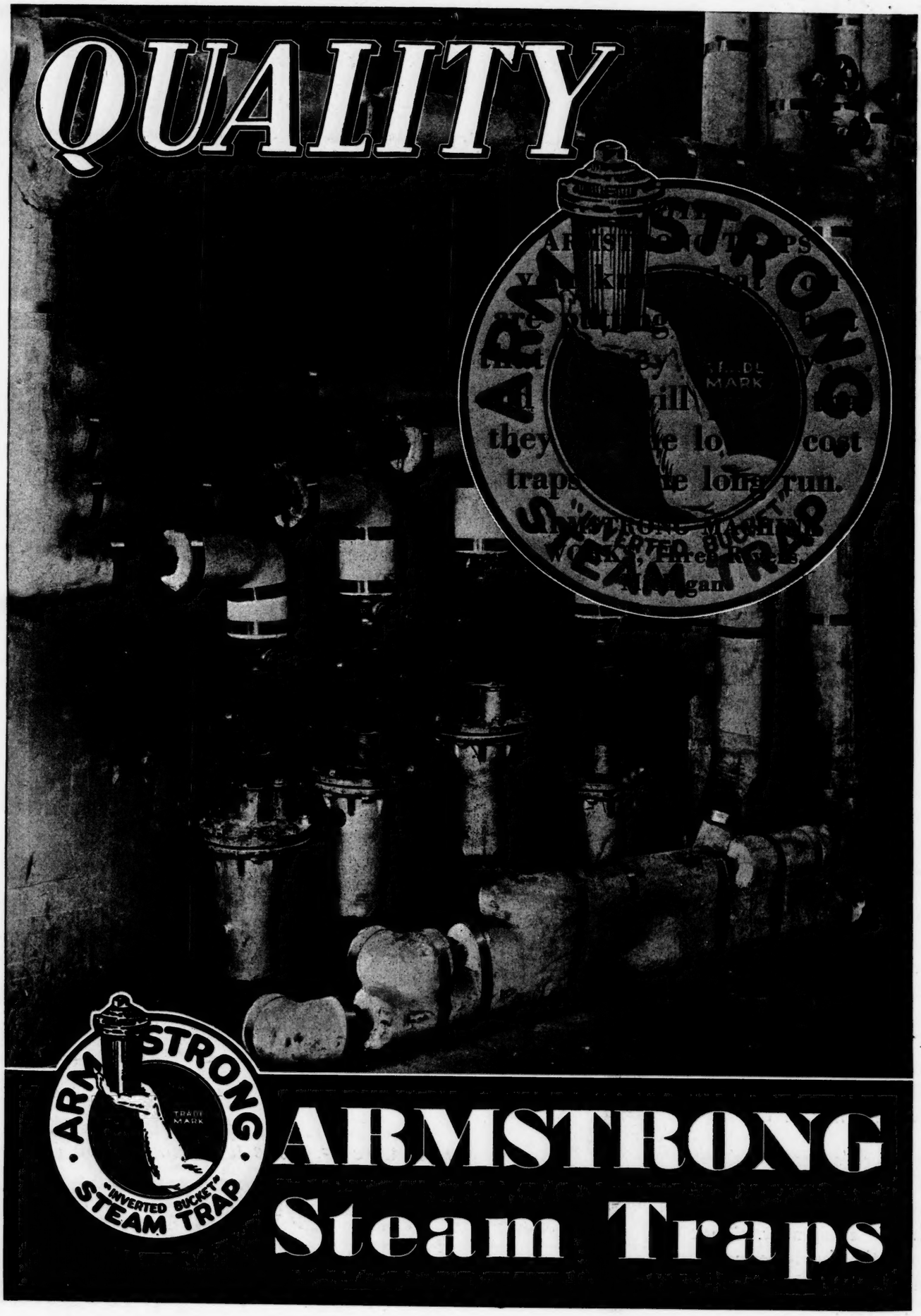
The World's largest sheet and tinplate mill and warehouses heated throughout with this equipment. Check up on the heat-producing, money-saving advantages of LEE Heaters.

Write, wire or phone for Bulletin 136

DRAVO-DOYLE CO.

Department AA

National Distributors . **PITTSBURGH, PA.**


QUALITY
ARMSTRONG
STEAM TRAP
ARMSTRONG
"INVERTED BUCKET"
STEAM TRAP
ARMSTRONG
Steam Traps

DETROIT STOKER COMPANY

GENERAL SALES AND ENGINEERING OFFICES
General Motors Building, DETROIT, MICH.
DISTRICT OFFICES IN PRINCIPAL CITIES
MAIN OFFICE AND WORKS: MONROE, MICH.

Products and Service

DETROIT STOKERS: Built in various types and sizes to serve heating and power boilers from approximately 30 hp. upwards. They are also used for special industrial process heating.

Bituminous coals, obtainable in all sections are successfully burned. Savings varying from 20 to 40 per cent over other firing methods are not uncommon with Detroit Stokers. Less expensive smaller sizes of coal are used.

Our engineers will study your requirements. District offices, located in principal cities, will furnish catalogs of any Detroit Stoker, or write DETROIT STOKER COMPANY, DETROIT, MICH.

Since 1898

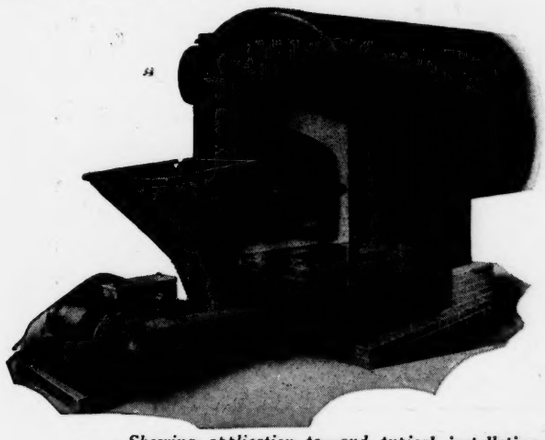
BETTER HEATING AT LOWER COST

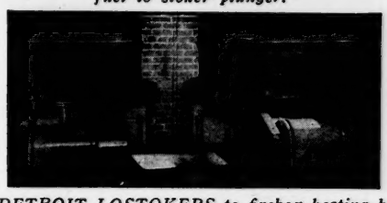
For steel firebox and tubular or cast iron boilers and small water tube boilers. Built in various sizes to fit the furnace. Plunger feed, side cleaning. Ashes are periodically dumped and removed through doors, provided at the front. May be driven by electric motor or steam turbine. Automatically controlled from steam pressure, water temperature or room thermostat. A great coal saver. Detroit Stokers often pay for themselves in two or three heating seasons due to increased boiler operating efficiency.

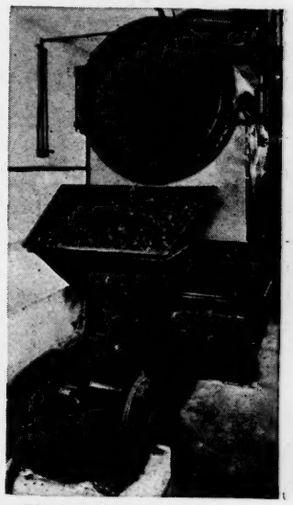
Note how coal hopper is designed so that the boiler door or doors may be freely opened to give access to the furnace at all times. Write for Bulletin 573.

Detroit LoStoker

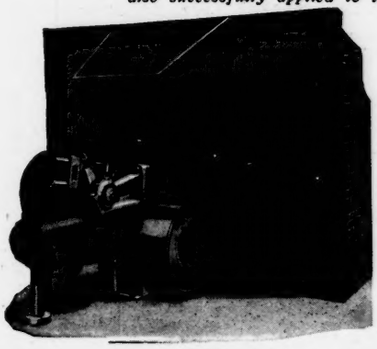
Plunger feed, side cleaning, air is admitted to all parts of the large active fuel bed. Agitator in coal hopper insures a continuous flow of fuel to stoker plunger.







Showing application to—and typical installation of—DETROIT LOSTOKERS to firebox heating boilers. These stokers are also successfully applied to tubular, or cast iron or small water tube boilers. Built in various widths to fit the furnace.

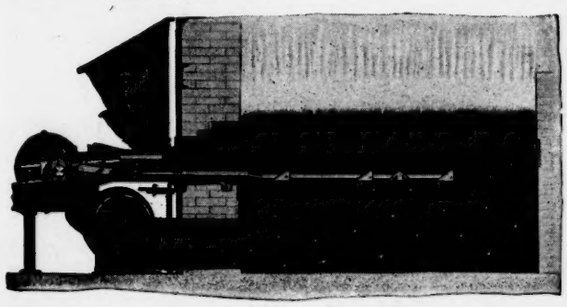


Detroit UniStoker

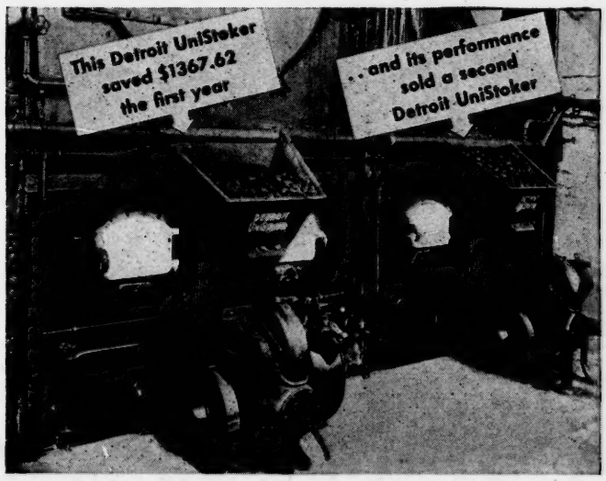
Each boiler and UniStoker is a self-contained unit motor or steam turbine driven, automatically controlled.

Detroit Single Retort Stoker

Detroit Single Retort Stoker for boilers from 100 to 300 horse power are mechanically driven, plunger feed, side cleaning. Large active grate area. Independent control of fuel feed and distribution.
Write for Bulletin 573.



Detroit UniStoker (Side View)
Arrows indicate flow of air to all parts of the fuel bed, plunger feed and side cleaning.



Detroit UniStokers with tubular boilers in Midwestern Hospital

DETROIT STOKERS

GROUND FLOOR
Opportunity
IN AIR CONDITIONING

AIR conditioning is a big, profitable business now. And it is just in its infancy! The market is everywhere. It hasn't even been scratched. Profits are excellent. The man who gets into this business *now* with the right kind of equipment is destined to prosper.

Fairbanks-Morse Ortho-Clime Air Conditioning equipment has in back of it the sound experience of seasoned air conditioning engineers. It is correctly designed. It is practical. It has eye appeal. And finally, it is backed by a company that for over a century has been successfully engaged in the adaptation of scientific principles to practical application.

Write for Details of Franchise

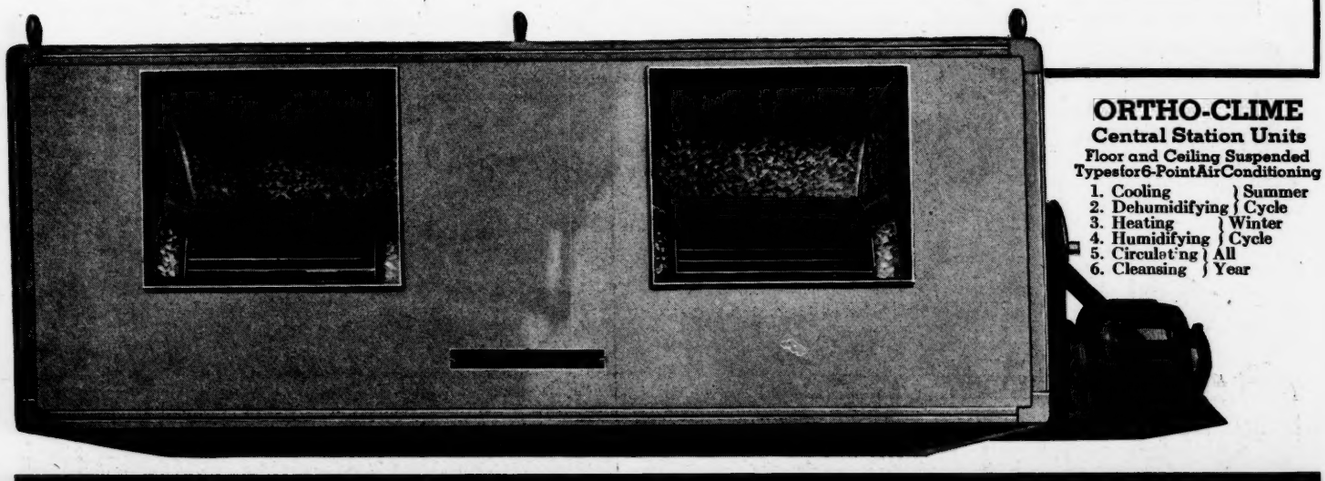
Ground floor opportunities like this are few. Fairbanks-Morse offers the ideal franchise to those who are able to meet the requirements. Write Fairbanks, Morse & Co., Dept. 1741, 900 S. Wabash Ave., Chicago, Illinois.

Ortho-Clime Central Station Units are compact. They may be connected to air duct systems or back of walls or partitions. Floor type units are available for ordinary application; ceiling type units for installation where floor space is at a premium.

Each central station unit is engineered to do a specific job. This saves you a great deal of costly engineering work and adaptation expense. All you do is figure the requirements of the proposed installation—then pick the unit engineered for the job.

A nation-wide branch house organization assures you of engineering, sales, and service assistance when you need it. Get the details now of the Fairbanks-Morse franchise. It is really more than a franchise—it is an opportunity—an opportunity you cannot afford to overlook.

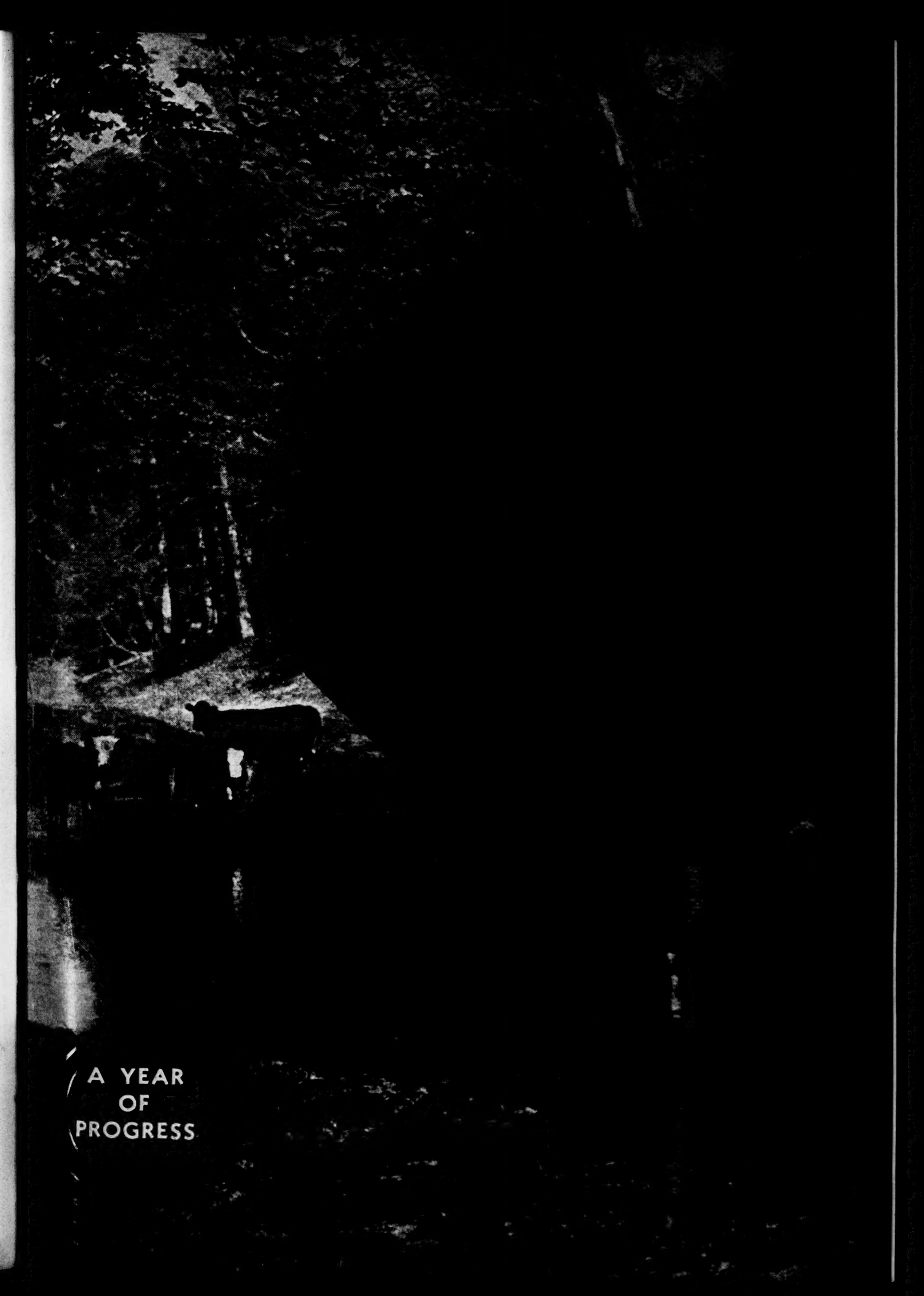
The Ortho-Clime line also includes a complete, self-contained unit room cooler. Easy to install. No special piping. All it is necessary to do is to back it up to a window—plug it in, snap the switch, and let it run.



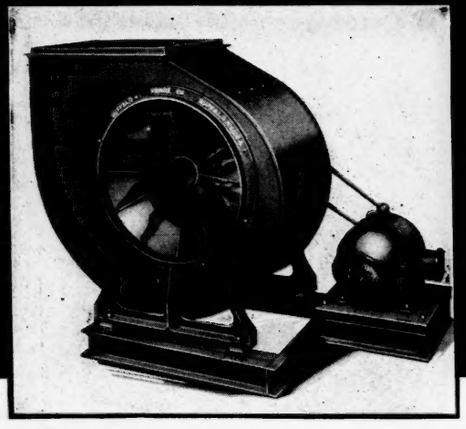
ORTHO-CLIME
Central Station Units
Floor and Ceiling Suspended Types for 6-Point Air Conditioning

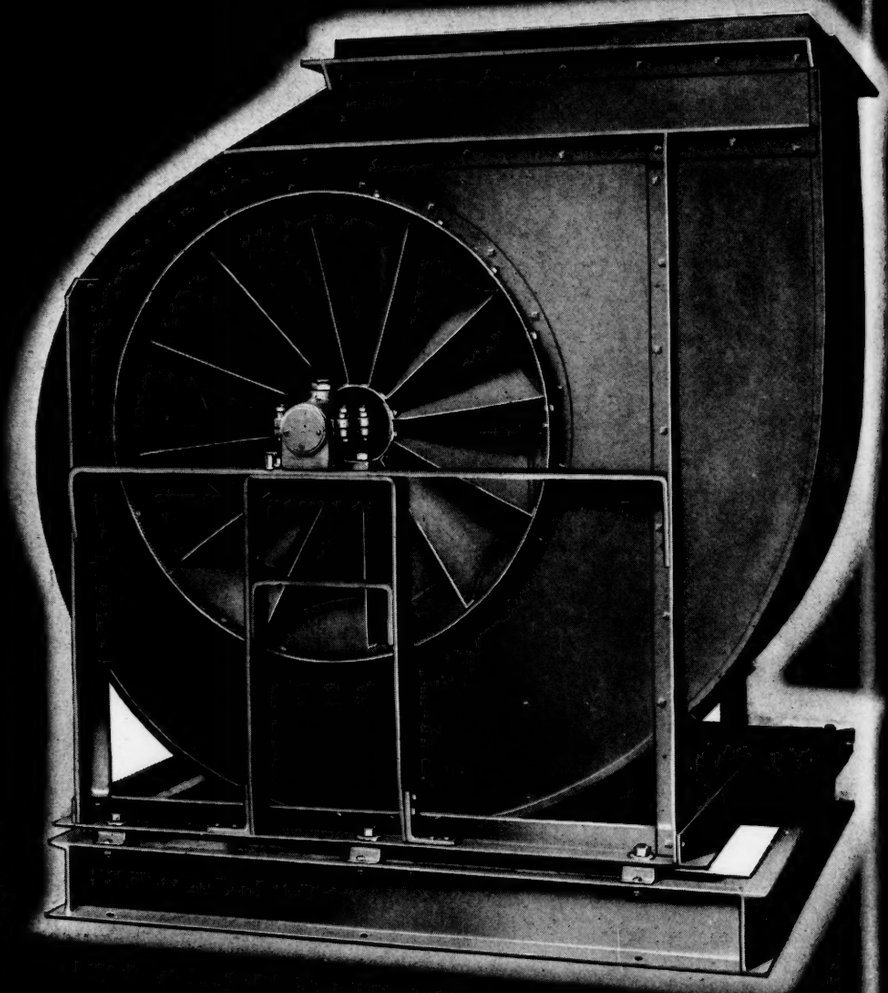
1. Cooling	}	Summer
2. Dehumidifying	}	Cycle
3. Heating	}	Winter
4. Humidifying	}	Cycle
5. Circulating	}	All
6. Cleansing	}	Year

FAIRBANKS-MORSE ORTHO-CLIME
AIR-CONDITIONING EQUIPMENT


A YEAR
OF
PROGRESS

Of course it's the RIGHT fan for the job – IT'S A "Buffalo"





HEATING and Ventilating Engineers know well the truth of the above statement. They know it because of many years of highly satisfactory experience they have had with "Buffalo" fans and "Buffalo" fan engineering service. They know, that regardless of the problem, "Buffalo" will place its entire resources at their disposal until that problem is SOLVED. They know from experience the higher efficiencies of "Buffalo" fans, their quieter operation and their ability to carry the load easily and without interruption year after year.

In short, they can be sure that when they specify "Buffalo", they'll have the RIGHT fan for the job.

Summer Cooling Up 6.3% in 1936

IN keeping with the prevailing attitude of the industry, the point of view in this section is that the summer functions consist of either cooling air or dehumidifying it, or both. A summer plant is therefore considered to be one which is capable of cooling or dehumidification or both. The summer plant may also perform other functions and frequently does do so, but it is common practice to put emphasis on cooling or dehumidification when considering the summer phase of the subject.

Much took place during 1936 and just what part of these happenings and developments really can be considered as contributing to progress is questionable. What seems like progress does not always finally turn out to be such. The aim here is to attempt to give as broad a summary as space will permit and space limitations have necessarily ruled out some points which doubtless did add to the year's accomplishments. As in the preceding sections the plan is to turn attention first to commercial aspects of the subject and then to review the engineering and technical phases so far as a short-term view will permit.

Statistics

The statistical situation is not well enough developed to permit anything approaching a full analysis. The figures which are available still have to be gathered by main strength and persistence. It is notable that during the year two developments took place which will shortly place the statistical material on a better basis. The electric utility trade association moved to standardize, collect, and publish the reports of the activities of its members, and the Department of Commerce started reporting the sales figures of manufacturers on an improved and expanded basis.

The installed value of summer air conditioning in 1936, based on reports from 40 electric utilities, increased 6.3% as compared with 1935, while the number of installations is estimated to have increased 44.2%. Table 5 shows detailed figures for territories covered by the reporting utilities. In most cases these reports cover 10 months of 1936 and not the entire year, but the first 10 months usually account for practically all of the business.

The greatest increase was shown in commercial buildings, while the reports indicate that industrial work fell off. Public and institutional air conditioning increased, a gain approaching 1934 levels and it is believed that final and complete reports will still further swell this total since some large jobs in Washington have not yet been connected to the lines of the utility and these figures do not appear in the totals.

Table 1 shows how the summer air conditioning business divided up during 1936 as compared with 1935.

Table 2 is interesting in that it shows the reports as totaled for cities of various population groups.

The greatest percentage increase is thus shown to be taking place in smaller cities while the larger cities actually show a decline in load connected during the year. The *number* of jobs, however, increased in all groups as shown in the table.

TABLE 1.—SUMMER AIR CONDITIONING BY BUILDING TYPE

Type of Building	1936		1935	
	No.	Hp.	No.	Hp.
Commercial	65.5%	74.0%	64.2%	67.4%
Industrial	2.8	5.6	5.7	16.8
Theater and Recreational	4.0	8.9	6.4	10.3
Public and Institutional	2.0	9.6	4.9	4.3
Residential	25.7	1.9	18.8	1.2
Total	100.0%	100.0%	100.0%	100.0%

The following comments dealing with specific cities are also of interest:

Chicago reports that the significant point in the 1936 business is the rapid increase in residential, private office and general office installations. It should be added also that Chicago now has more than 200 air conditioned restaurants.

Table 3 is of value in that it shows the breakdown by size of jobs added during 1936 to the lines of the New York Edison Company which serves the boroughs of Manhattan and Bronx.

TABLE 2.—SUMMER AIR CONDITIONING BY SIZE OF CITY

Population Group	Increase, %	
	No.	Hp.
4 cities over 1,000,000 population	+ 40.0	— 4.7
6 cities between 500,000 and 1,000,000	+ 48.3	+ 4.5
30 cities less than 500,000	+ 45.8	+ 17.4

The Dallas, Tex., figures as reported are somewhat swollen due to the fact that of the 4093 hp. installed, 2148 hp. were provided for the Centennial Exposition.

There are now over 8000 railroad cars cooled of which somewhat over 2000 were equipped during 1936. This total compares with slightly less than 3400 conditioned during 1935, indicating that perhaps the point is fast being reached where the railroads will have all of those cars cooled which they feel it will be profitable to cool. The breakdown by type of plant built in 1936 and 1935 is shown in Table 4.

Of the 8031 cars now conditioned, 3907 are railroad-owned cars and the remaining 4124 are Pullman-owned.

It will be noted from Table 4 that the number of newly cooled cars using ice dropped off less than either mechanical or steam.

TABLE 3.—SUMMER AIR CONDITIONING SYSTEMS INSTALLED BY SIZE OF JOB, NEW YORK CITY, 1936

Size, Hp.	No. of Jobs	Horsepower
Less then 10	78	500
11 to 20	56	910
Over 21	94	5434

TABLE 4.—NUMBER OF RAILROAD CARS CONDITIONED, 1935 AND 1936

Type of System	1935	1936
Ice	993	951
Mechanical	1808	911
Steam	549	204
Power drive	10	59
Front end drive	6	6
Total	3366	2131

It is difficult to determine exactly how much progress ice is making in general air conditioning but reports seem to indicate that probably 200,000 tons of ice were used during 1936 for the cooling of buildings and railroad passenger cars combined.

It is probably safe to say that in buildings 90% of the connected summer air conditioning load utilizes electrically-driven compressors.

The accompanying chart, Fig. 1, page 64, shows the breakdown by type of business for all of the years since 1929. It should be noted that the 1936 breakdown is preliminary. The increasingly important part played by summer air conditioning in the total business of the heating and air conditioning industry is shown in Fig. 2, page 64.

Marketing and Distributing Methods

Markets and marketing continued to draw attention during the year as they have for several years past. So far as methods are concerned there is little to report. There is no indication that anyone has found or is likely to find a "one best method" which all can adopt. Instead the progress seems to consist of a better compre-

TABLE 5.—NUMBER AND SIZE OF SUMMER AIR CONDITIONING INSTALLATIONS MADE IN 1936 AND 1935

(As reported by 40 electric utilities to whose lines the installations are connected. Gas-powered installations not included. 1936 figures are preliminary.)

City	1936		1935	
	No.	Hp.	No.	Hp.
Boston	77	1830¾	56	1603½
Metropolitan New York:				
Manhattan and Bronx	228	6842½	204	7672
Brooklyn	51	2508¼	65	2614¼
Queens	27	703	9	161¼
Newark	82	1482½	54	800¼
Philadelphia	178	4198¾	116	4770½
Baltimore	106	1596½	88	2400
Washington	124	8924	159	8634
Rochester	38	1701	28	668¼
Buffalo	33	1592½	46	656
Pittsburgh	113	2319½	95	1422¾
Toledo	47	1201	26	490
Detroit	220	2021	100	4165¼
Cincinnati	172	1983	96	2505
Indianapolis	88	821¾	27	1500
Chicago	420	7434	309	5485
Milwaukee	26	483½	25	441
St. Louis	382	4605	187	5370¾
Birmingham	47	583	22	951½
Louisville	37	501¾	35	713
Dallas	172	4093	70	1253
Houston	75	1182¾	46	2466¼
Hartford	13	331½	14	172
Des Moines	69	2388	49	423½
Manchester, N. H.	3	32½	4	52¾
Oklahoma City	156	1471½	55	844¼
Portland, Oreg.	32	36½	42	85
Scranton	22	386	11	248½
Providence	20	347½	6	46
Columbia, S. C.	9	149¾	4	631½
Memphis	2	50	24	253½
Ft. Worth	25	693¼	13	99
San Antonio	40	886¼	29	956¼
Spokane, Wash.	9	74½	15	75¼
Hagerstown	25	88¼	17	51
El Paso	16	148	13	170
Springfield, Mass.	17	133	23	568½
Richmond } Norfolk }	60	1273	73	1818
Cedar Rapids	13	201¾	14	133¾
Raleigh } Asheville }	26	200¼	18	118½
Grand Total	3300	67499¾	2287	63490¾

hension of the circumstances by those responsible for marketing. Many preconceived notions about how summer equipment should be marketed have now been discarded. This attitude of mind is in itself no small item of progress. Throughout the year marketing methods therefore continued to be devised. It is believed that at least some marketing organization is trying out every known or suggested method of getting its products into the hands of users. Whether all these trials will finally result in agreement on a method is doubtful to say the least. The simple truth is that the product, the organization, and the immediate objective all affect marketing methods. Nowhere is it more true that "what is one man's meat is another man's poison."

If any one fact did come out of all the welter of experiments and trials of marketing, it is the realization that there is no substitute for good, sound applicational engineering in connection with attempts to market summer equipment. It is the one item which cannot be omitted at this stage of developments. The day may perhaps come when this may not be the case but the experience of every single attempt to market without technical applicational skill simply goes to confirm the general truth. What sometimes confuses the picture are the questions of who shall supply this skill, who shall employ it, and how it shall be compensated and best handled. They are coming to be recognized, however, as questions of detail and not of principle. It is believed that 1936 did see some advances in a better understanding of this situation.

Engineering and Technical Aspects

Techniques in summer cooling and dehumidifying continued throughout the year to pass through the stages where all are open to engineering question and to active. and often highly partisan, discussion. There is nothing alarming about this. It is perfectly natural and simply reflects a high degree of technical interest. Also it reflects a scarcity of field data drawn from plants operating under all kinds of conditions. Such information in volume only began to appear late in the year. Naturally, it requires time to ponder over these operating results, to evaluate them as compared to first costs of installation, and as to results obtained by various competing methods. Until there can be definite crystallization of opinion based on results from the great laboratory of actual use, it is to be hoped that this questioning attitude can be continued. Indeed it should be encouraged, for progress lies in that direction. Any technician who shuts his mind at this stage and decides that he knows the only true and correct answer to the proper ultimate method to be used in either cooling or dehumidifying air is going to be greatly astonished to find how much in error he really is.

Standardization

In view of the foregoing it seems paradoxical to report that there was a good deal of work done in developing standards for cooling and dehumidifying during 1936. Actually, though, there is nothing surprising about the standardizing which was accomplished. Much of it was tentative and so arranged that changes can be readily made, for it seems generally recognized that the whole subject of summer conditioning is moving so fast and is so open to technical development that standards should be approached warily.

Principal moves of the year in connection with standardization of practice were those promoted and sponsored by Air Conditioning Manufacturers Association. This association drew up and published a set of standards for applying comfort air conditioning. This codification included not only summer standards but winter ones as well. (Published in full in HEATING & VENTILATING, July, 1936.) It is by far the most comprehensive set of engineering application standards which has appeared. Also preparation and publication of such a set of standards by a manufacturer organization was unique in this whole industry. This same association also adopted a set of standard rules for testing and rating air conditioning equipment and condensing units. These rules were in the form of two separate codes, which codes at the year-end were also adopted by the American Society of Refrigerating Engineers.

During the year, too, a joint committee of the American Society of Refrigerating Engineers and the American Society of Heating and Ventilating Engineers was organized under the chairmanship of L. A. Harding to attempt to formulate national standards for applying air conditioning. This committee also is concerned with standards suitable for both summer and winter applications. While it is reported that preliminary work was accomplished no report of this committee appeared.

The committee is really an outgrowth of work done in several cities looking toward application standards for air conditioning. A conspicuous example of such local movements was the case of Chicago where, following agitation and prolonged discussion, a code outlining standards of application was drawn up and adopted by a number of local organizations interested in eliminating confusion caused by a diversity of methods in use there. The original code was published late in 1935 but was extensively revised late in 1936 (see HEATING & VENTILATING, December, 1936). Air conditioning bureaus and other local groups in several cities studied local conditions with a view toward establishing local codes and standards of their own.

As a result of all this agitation and the preparation and adoption of so many codes for application there was some indication that in many cities the worst of the evils resulting from discrepant estimates are either in the past or at least the means for mitigating them are at hand. It is believed that enough restraint has generally been exercised in preparing these standards to prevent their being abused.

Safety Code for New York

Generally there has been no attempt as yet for legal bodies to legislate concerning standards of installation of summer air conditioning. However, in New York City there is a movement on foot to revise the existing ordinances on refrigerating systems to include safety regulations covering the use of refrigeration systems with air conditioning. During the year a proposal for such a revision was drawn up by C. K. Michaels of the

Bureau of Combustibles, New York Fire Department, as a basis for public hearings. In the spring, hearings were held at which various changes were proposed. Consideration was given to these changes and a second proposal appeared dated November 24. A hearing on this was held early in December at which further changes were suggested. Final action was deferred.

Progress in Extending Applications

Summer comfort conditioning has found its increase in volume recently through being able to find new applications fast enough to more than offset the shrinkages encountered as the volume fell off in the classes of buildings where summer cooling was formerly installed rapidly. For this reason new applications of comfort cooling are watched with interest both to note how the applications are worked out and because successful solutions to the application problems foreshadow increases in volume.

During 1936 several installations were reported in apartment houses. This has long seemed like a promising application. Methods used were diverse, however, and there is no indication that a generally suitable solution to the apartment house problem has been reached.

Hotels, especially guest rooms in hotels, have also offered an attractive prospective field. The type of system installed depends largely upon the construction of the hotel. In those cases where all or large numbers of the guest rooms were cooled the usual installation has a central refrigerating unit in the basement which furnishes chilled water to air conditioner rooms located at various points throughout the hotel. Cooled air is then distributed from these rooms to the guest rooms by ducts and returned through the halls. In some cases where the hotel already had ductwork installed for ventilating this was used to distribute the cooled air. Some hotels installed individual room units but the use of these was limited to those cases where only a small number of rooms was to be conditioned.

A partial list of hotels conditioned during 1936 includes: Hotel St. Regis, New York, approximately 240 rooms; Carlton Hotel, Washington, D. C., completely air conditioned, total of 256 rooms; Statler Hotel, St. Louis, 300 rooms; Stevens Hotel, Chicago, guest rooms on 23rd floor conditioned; Palmer House, Chicago, several guest rooms; The John P. Harding Hotel, Chicago, 65 guest rooms; Adolphus Hotel, Dallas, Tex., number of public rooms and radio broadcasting station; Kenmore Hotel, Boston, several public rooms.

Transportation

Alone among the transportation agencies the steam railroads have generally accepted summer cooling in earnest. A section of Fig. 1 below gives a graphic record of this progress during the years. No innovations in methods were reported. A committee of the Association of American Railroads continued its study of air conditioning. Electric railways showed no tendency to adopt summer cooling. Auto bus companies are reported to be investigating the possibilities but applications are still on a trial basis. One company in Texas is said to be experimenting with mechanical refrigeration to cool its buses, while another in Ohio is using dry ice. At least two manufacturers of summer conditioning equipment showed systems for use with buses but no installations are known.

It was stated privately by a prominent automobile executive during the year that his company was prepared to offer summer cooling in its cars whenever the public wishes it. He felt that the present costs, however, are so great that there would be few purchasers. Individual experimenters here and there tried cooling their cars. Aside from that there was no reported activity, although it is freely rumored that much is going on under the surface.

Applications in Residences

Although reports continue to show that summer cooling for residences has not caught on, there is still confidence that eventually this is to be the great volume market for summer comfort cooling. The prospective volume offers such an attractive return to whoever can really tap this potential that there is no end to trying. The bugaboo is still cost, although there is evidence that poor performance of early installations is acting as a brake. Also there is still considerable skepticism of the necessity of cooling detached, well insulated, awninged residences in many parts of the country.

Elsewhere in this issue the approach to the problem worked out by one prominent manufacturer is outlined (see winter section under heading Residential Package Merchandise).

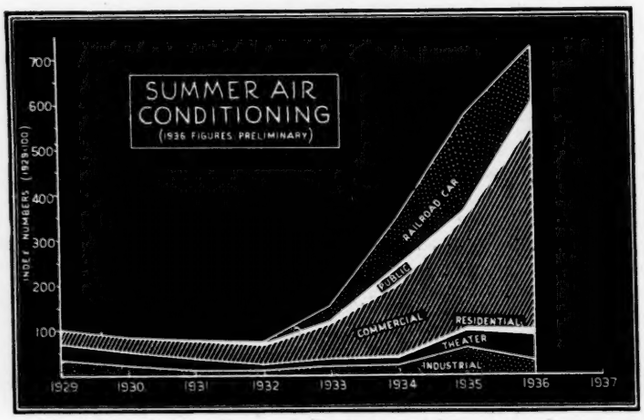


Fig. 1

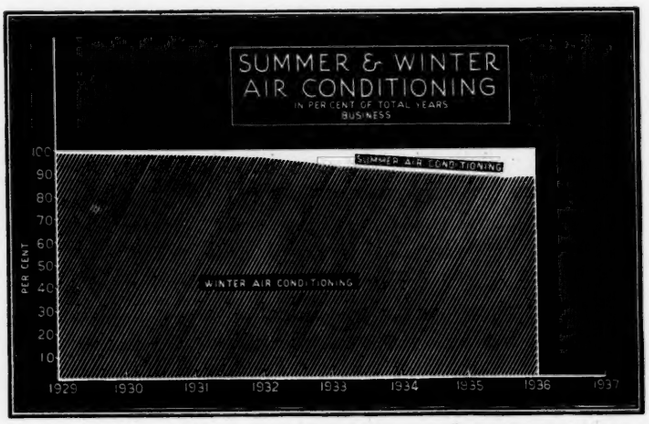


Fig. 2

Other aspects of the residential cooling problem prominent during the year include the extended use of attic fans, and of automatic use of night air through circulating ducts. Much wider use of these methods is reported especially from the south and southwest. If dependence can be placed on published reports, there is reason to believe that many who have used these methods are well pleased with the results.

Thus, while there was no particularly outstanding advances in securing residential cooling business in 1936 there is progress of a sort and also a growing feeling that the key to this situation will be found. There is still emphatic disagreement as to how soon.

Hospital and Medical Use of Cooling

Cooling of operating rooms and patient rooms in hospitals has not progressed far commercially. During the year a few installations were reported. A number of hospitals are engaged in trials. Patient effects are being watched closely. A report of a committee of the American Hospital Association recommended continued study but did not advocate immediate installation of air conditioning.

In treating a few specific diseases there is reason to believe that cooling may be helpful. How generally this may be the case is a point on which there is little information. Some engineers feel that there should be more, and during the year the American Society of Heating and Ventilating Engineers research organization made plans to include this subject in future studies. A division to be devoted to organic research was organized under the direction of W. L. Fleisher. Said W. A. Danielson who served as chairman of the whole research activity, "As technicians in the handling of air, engineers are offered a great opportunity to extend the art into new channels where it can be used by the doctor, the surgeon, the medical laboratory man, and the researchers." No results appeared from this activity which is just undergoing promotion.

Progress in Technical Information

No especially outstanding contributions to new technical information were reported during the year. Studies were made by several companies covering the mechanism of heat transfer and these results were reported. Cooling at the Research Residence at Illinois produced some papers. This study has gone on long enough to permit generalizing on the results to some extent. Experimental residences operated under the control of individual companies continued to be a favorite method of collecting data but little such information is ever made fully public.

If there was but little progress in new technical information, the same cannot be said about the use of that already in existence. The demand for usable technical material especially prepared for application engineering is still not satisfied. However, there is now a wealth of pamphlets and manuals in existence giving detailed rules of procedure where these are possible and giving procedure outlines and data where specific rules cannot be applied. During the year these publications continued to appear until now most manufacturers of equipment have something of this kind and so do most of the special groups who advocate some special method, material, or equipment.

Of the booklets put out by organized groups, one is mentioned because it represents an initial effort and includes information not generally available before. It is the result of the work of a committee of the National Domestic and Farm Pumping Equipment and Allied Products Manufacturers, which committee was headed by Neil D. Skinner. This booklet is prepared in the usual form and gives load estimating data, applicational information, estimate sheets, a worked-out example, and sketches showing suitable layouts. It appeared under the title "Summer Air Conditioning with Well Water."

Unusual Angles

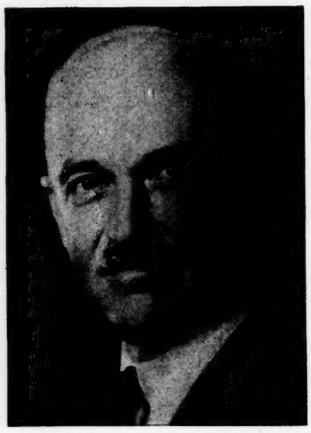
Each year there are some departures from customary methods. During 1936 several are singled out for mention. At least four windowless buildings appear in the year's records. Summer cooling is definitely a part of such a building. Two of these buildings are of glass brick construction. In at least two cases projects were reported where the entire roof of the building is flooded with water. This is equivalent to a cooling pond of the kind so frequently used in electric power plants. The water cools the whole roof area and is said to reduce the cooling load on the equipment. In Washington a central plant is reported under construction to serve not only the Capitol but the Senate and House office buildings. A west coast movie set is equipped with an installation for furnishing the local color for snow scenes and even snow storms to order.

Engineering Thought on Cooling Means

During the year electrically-powered compression equipment continued to dominate the cooling field in spite of all efforts by its competitors to displace it. Many engineers continue to assert that this is not to be a permanent situation and that it comes about now because of excellent team work, good organization, and tactics used to hold this method in favor. The steam jet refrigeration which does not use electric power continues to be mentioned as having good promise, but absorption methods using coal, oil, or gas as fuel are favored by some because they use relatively cheap forms of power. It is asserted by their partisans that they can and will be developed to a point when they can displace electric power.

All such statements are now almost wholly assertive without much proof of a concrete nature to support them. Really they are merely attempts to predict future trends and this is always risky. The real kernel in this situation is that engineering attention is being turned to the fundamentals of cooling as never before. More and more technical skill is becoming available each year and as this goes on all aspects of cooling, and of heat exchanges both winter and summer, are being more and more minutely examined.

There was some evidence also during the year that the fact that summer cooling is a dual problem is becoming better appreciated. Cooling is technically a process quite separate from dehumidification and can be treated separately, accomplished separately, and



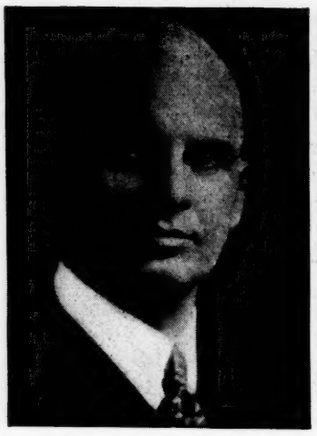
Herman Russell, President, American Gas Association, Rochester Gas & Electric Co., Rochester, N. Y.

W. F. Brannan, President, Oil Burner Institute, Anchor Post Fence Company, Baltimore, Md.

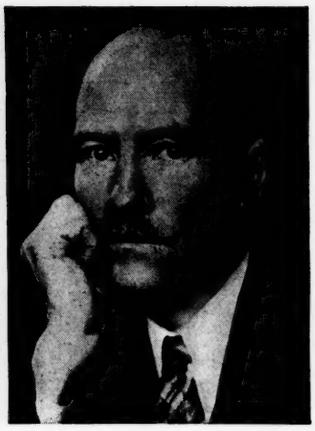
J. Miller, President, Association of Heating Contractors of Greater New York, Inc., Universal Heating Company.

A. E. Beitzell, Manager, Air Conditioning Division, Gannett, Eastman & Fleming, Inc., Harrisburg, Pa.

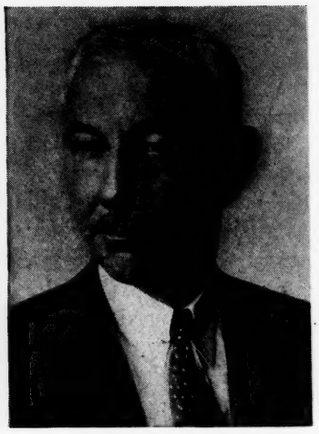
Contributors to A Year of Progress



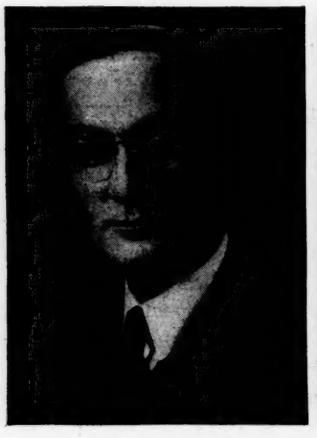
Howard Coonley, General Chairman, Manufacturers Standardization Society of the Valve and Fittings Industry, Walworth Co., New York.



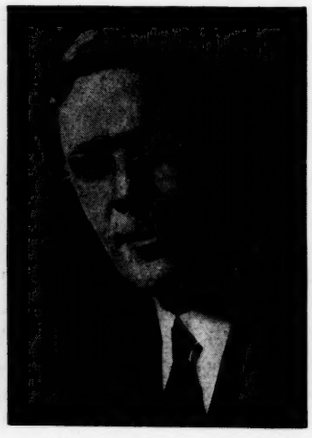
W. A. Danielson, Chairman, Committee on Research, American Society of Heating and Ventilating Engineers, U. S. Army, Washington, D. C.



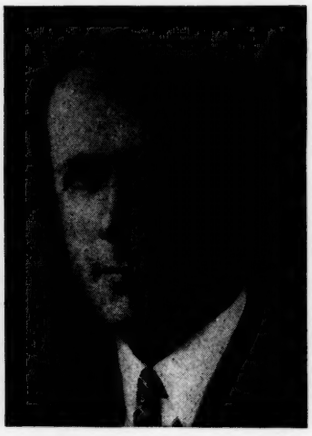
A. W. Akins, President, Industrial Smoke Abatement Association of Hudson County, Standard Oil Company of New Jersey, Bayonne, New Jersey.



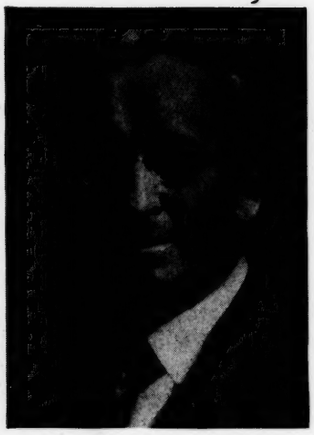
W. L. Rybolt, President, National Warm Air Heating & Air Conditioning Association, The Rybolt Heater Co., Ashland, O.



R. C. Goddard, President, National Association of Stoker Manufacturers, The Steel Products Engineering Co., Springfield, O.



John H. Zink, President, Heating, Piping and Air Conditioning Contractors National Association, The Heat & Power Corp., Baltimore, Md.



J. D. Hoffman, Chairman, Committee on Compiling Codes for Furnace Installation and Changes, NWAH & ACA, Purdue University.

thought of separately. It is only when refrigeration is the means used for accomplishing summer conditioning that the two functions of cooling and dehumidification have to be regarded as one process. Adsorption methods accomplish dehumidification without cooling and cooling can then be accomplished as an entirely separate process. During the year the adsorption processes continued to be installed.

At least one oil burner manufacturer also developed equipment for using the absorption method of refrigeration with oil as the primary energy source. Systems which spray an absorbent chemical across the air stream, using chemicals such as lithium chloride, were also installed during the year. Attention to those facts and these methods is slowly affecting technical thinking.

Ice for Summer Cooling

It is difficult to get a true picture of just where ice now stands in summer cooling for comfort. During 1936 the manufacturers and sellers of ice continued to promote its use. In some measure they were successful. Partisan views are so emphatic against the use of ice, and the return of questionnaires is so scattered and spotty that evaluation of progress is almost impossible. What follows is based on such statements as could be obtained from various people who are directly interested in ice. To what extent they may be regarded as opinions only, there is no way of knowing.

By and large, engineers employed by ice companies take the attitude that they are making headway. Some feel, and state frankly, that ice can be used permanently only on low load factor installations. The figure of 2% annual load factor has been mentioned as the point below which ice can be used to such advantage that it can prove its contention of economy against all comers. If this is the approximate (or average) point, manifestly there are cases where ice can be used when the annual load factor is considerably above this point. Others take the attitude that 2% is entirely too low a figure. So far as known there is no way of setting this value definitely except by a case method because local factors necessarily enter.

Another point urged in connection with ice is novel. It is to the effect that ice is to go into many places such as restaurants, small theaters, and similar places whose competitors have already put in summer cooling. Those remaining cannot afford high priced installations but want something. They, it is argued, can be made to see the advantages of ice.

One correspondent states that places where there is already a ventilating system with ducts installed are especially suitable for adding ice cooling equipment because it can be done at low first cost.

Methods of applying ice for cooling have been rather stable, but one engineer in a midwestern city has supplied sketches showing methods used there. As these are believed to be different from the cycle usually used they are reproduced here.

Fig. 3 shows a surface condenser and a forced draft cooling tower. The arrangement achieves counterflow of air and water. Water from the cooling tower encounters the warmest air and removes from it a portion of the sensible heat. The precooled air then passes through two colder coils supplied from the ice melting tank. The excess water in the system produced as the ice melts is released through a float-actuated circuit to waste over the roof, thus discharging to waste only the warmest water in the system and using it to reduce the heat load by cooling the roof surface. This method is especially desirable when there is a considerable difference between wet and dry bulb temperature.

Fig. 4 is said to be more desirable where there is little difference between wet and dry bulb temperatures. It uses a spray conditioner and an economizer coil. Again a float-actuated switch takes care of relieving the excess water to the roof after having used up as much of its available cooling power as conditions will permit.

Condensing Water Problems

Where water cooling of condensers is used the amount of water which must be passed through the system is

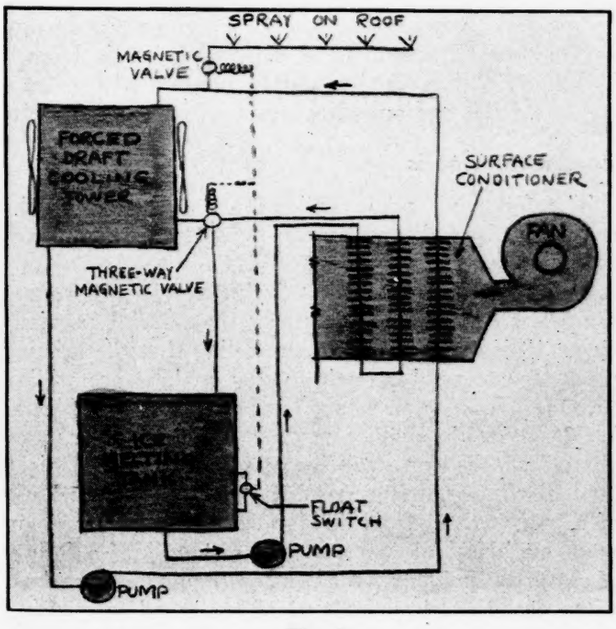


Fig. 3

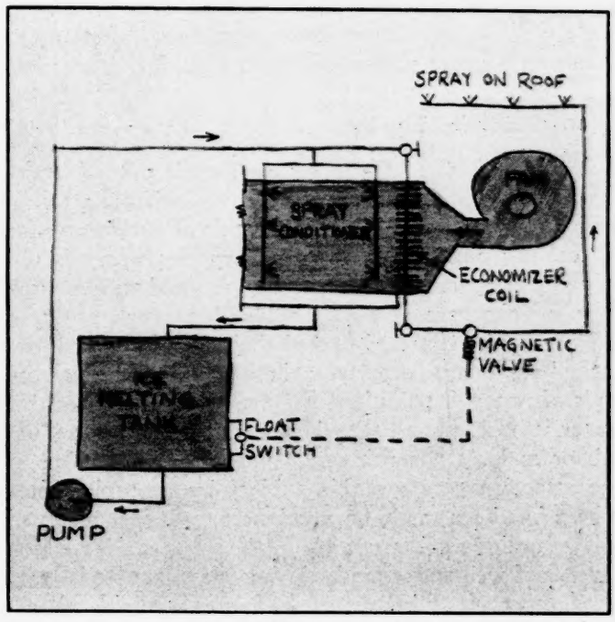


Fig. 4

large. The water must reach the condenser at a temperature low enough to accomplish the condensation of the gaseous refrigerant and should be of good enough quality so that it will not seriously corrode equipment or cause a nuisance in other ways.

The problem of where to secure enough water meeting these requirements is gradually becoming pressing. In some localities where there is a concentrated demand, as in the downtown centers of the larger cities, water supply officials are now concerned and in certain cases publicly owned water supply departments here refused to furnish water for condensing refrigerants.

Among the devices to which study has been given in connection with the problem are means of substituting less desirable water such as sewage instead of fresh water, artesian water, and means of economizing on the quantities of water necessary. One way to economize on the use of water is to substitute air cooled condensers for water cooled condensers, thus doing away with the necessity of using any condensing water at all. Securing good heat transfer through air cooled condensers, however, is not simple and large amounts of surface are necessary.

During 1936 attention was increasingly turned to the spray or water-covered condensers as a suitable compromise between straight water cooling and straight air cooling. In these condensers a fan moves air over the condenser surfaces (usually coils). At the same time water is sprayed or otherwise passed over the coils. The water wets the surfaces. Heat passes from the refrigerant to the water on the surface of the coils, thus heating the water. The heat in the water passes to the circulating air by evaporation. These condensers can be considered forced draft cooling towers into which a condenser is built. Enough water has to be added to the circuit to make up for the water evaporated. It is stated that upward of 90% of the water necessary with direct water cooling of condensers can be saved by using evaporative condensers. They can be placed either indoors or outdoors. Use of cooling towers located either indoors or outdoors also continued to attract attention during the year as another means of economizing on the use of water. It is to be expected that attempts to reduce condenser water use will go on for some time.

Well Water for Cooling

Another phase of the water problem is that of securing suitable water for complete air cooling from artesian wells, or to make the best use possible of such water for air cooling purposes. In many localities water is obtainable without excessively deep wells and with enough flow to take care of small installations such as those which may be expected to find their way into small detached residences, especially those in suburbs or at the ends of water distribution systems. In many cases this water is cold enough to either do the whole air cooling job or at least a considerable part of it. Mention of the attention given to this subject by a special committee has been made on previous pages. Members of this committee call attention to the great strides which the use of well water made during the year. It is scattered, however, and there are no figures available whereby its progress can be measured statistically.

Report of Electric Utility Committee

The electric utility companies in many cities have given their active cooperation to efforts to increase the popularity of summer air conditioning where electrical energy is used as the source of power. A committee of Edison Electric Institute has been studying many phases of such air conditioning for some time. This activity continued during 1936 and late in the year its report was made public. This is in the form of a 60-page pamphlet designated D 12 and issued in December, 1936. Under the leadership of C. E. Michel, chairman, this committee collected factual data on the operation of about 200 summer plants in cities well distributed over the whole country. The pamphlet lists these reports as cases and thus presents by far the greatest mass of operating data which has appeared to date. The plants reported include examples of virtually all kinds of summer plants both large and small. Only a very few residences are included. In nearly all cases figures are given showing the volume of space conditioned, the nature and size of the equipment installed, the quantities of electric energy used. In some cases these energy quantities are given by months, and also in many cases the number of hours during which the compressor and fans operated.

This same committee also launched a plan for securing uniform reports on the number and character of installations of summer conditioning made in the principal cities, cooperated with manufacturer associations, and included in its pamphlet examples of promotional material used in aiding the expansion of summer installations. Interesting, too, is the attention given by this committee to the use of attic fans for summer cooling and to exhaust fans for ventilating kitchens.

Enough operating data are now on hand to confirm within reason the conclusion that annual load factors for residential installations are considerably less than those for most commercial installations in the same locality. Hours of operation are shown to vary greatly even between sensibly similar installations in the same city. Hours of operation of a particular installation seem to vary more with the nature of the load and the method of control than with the climatic factors. These are points which could be predicted by reasoning alone but the operating results lend confirmation.

Equipment Trends

The following pages which illustrate most of the equipment brought out during the year are themselves the best means of following trends and progress. However, it should be noted that during the year there was much less of this new equipment than during previous ones. This condition reflects a feeling that the existing products are good enough so that makers are willing to rest their cases on what they are now offering. Also it shows that the rush of new firms to the field has now virtually ceased. It will be noted too that there is a tendency toward refinement in detail and toward use of factory methods which are confidently based on quantity. Nothing can speak more loudly of a feeling of future confidence than when equipment makers adopt designs and methods which are based on securing quantity.

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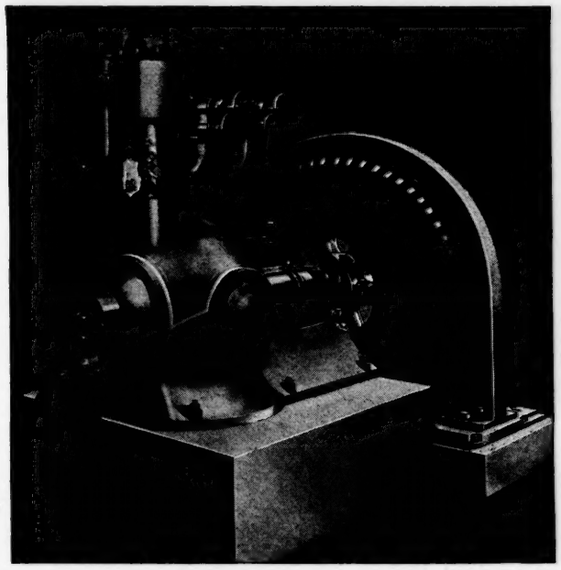
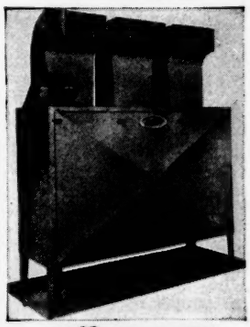
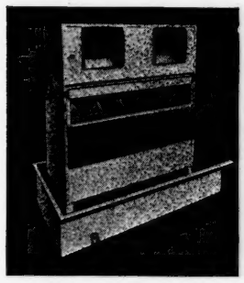
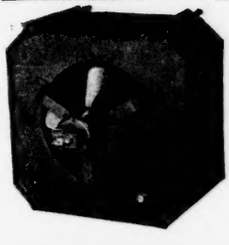


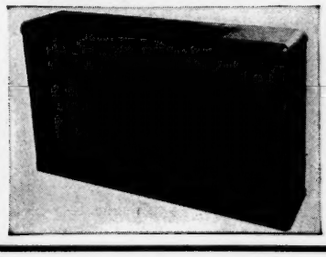
ColdStream UNITS

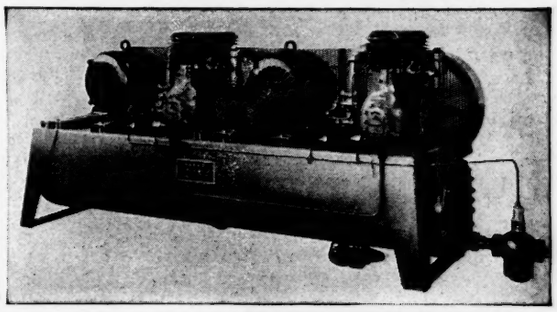






Upper left: ColdStream Forced Draft Coil Unit.
Left center: ColdStream Fan Type Suspended Unit.
Lower left: ColdStream DeLuxe Model Suspended Type Unit.
Above: ColdStream Forced Draft Brine Spray Unit.
Below: ColdStream DeLuxe Model Floor Type Unit.





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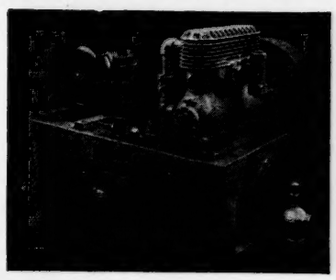
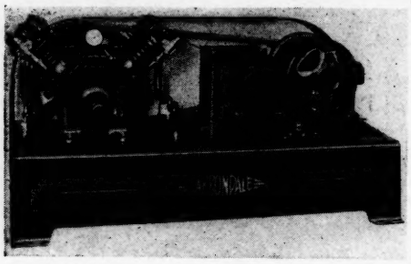


BAKER
Ice Machine Co., Inc.
1525 Evans Street, OMAHA, NEBRASKA
Branch Factories: Fort Worth, Los Angeles, Seattle.
Eastern Sales: New York.
Central Sales: Chicago.

ACMA

Authority on Mechanical Cooling for over 30 Years.

1936 Progress in Summer Equipment



Carbondale Condensing Units

NAME—Full line of condensing units.

FEATURES—A full series of models designed for Freon and methyl chloride. Air cooled models have shrouded condensers and are suited for installations where adequate water supply is not available at a reasonable cost. Water cooled models of 3 hp. and over have horizontal shell and tube condensers mounted on a heavy welded base. These are particularly well suited to air conditioning requirements. They have V-type compressors of the heavy duty pattern with discharge and suction valves built on the feather valve principle, all located in the heads to secure even temperature. Motor starting box and automatic control are fully protected, wired, and piped, ready for main connections.

SIZES AND CAPACITIES—Line includes 18 sizes, from ¼ to 25 hp. Air cooled models are from ¼ to 2 hp. Water cooled models from ½ to 25 hp.

MADE BY—*Carbondale Machine Corp., Harrison, N. J.*

Westinghouse Condensing Unit

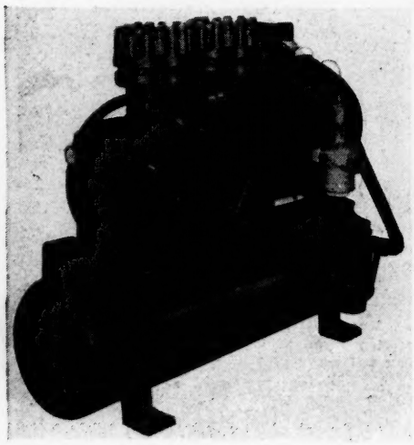
NAME AND MODEL NUMBER—Westinghouse air conditioning condensing unit, type CLS.

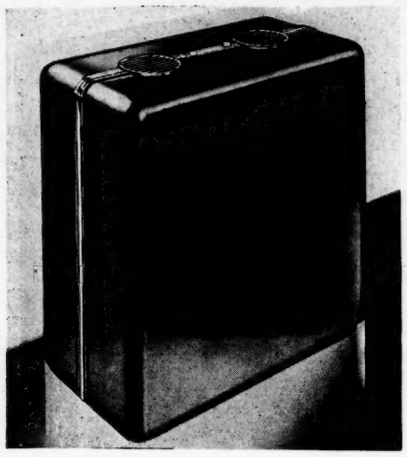
PURPOSE—To supply cooling for air conditioning.

FEATURES—Consists of motor, compressor, and a combined condenser and refrigerant receiver. Motor and compressor are hermetically sealed. A water cooled generator and the compressor are mounted on a common crankshaft, and since they are made from a common casting, no shaft seal is required. A series parallel condenser manifold permits the use of either city water or a cooling tower. Mechanical adjustments are made through side service plates without disturbing either the unit itself or the refrigerant of water lines.

SIZES AND CAPACITIES—7 to 22 tons ice melting effect in 24 hr.

MADE BY—*Westinghouse Electric & Mfg. Co., Mansfield, Ohio.*





Nelson Summer Air Conditioner

NAME — Self-contained summer air conditioner.

PURPOSE—Cooling, circulating, and dehumidifying air for summer use.

SIZES AND CAPACITIES—Heat absorption capacity of 8,000 B.t.u. per hr. Air capacity 425 c.f.m. and dehumidification capacity 2.5 lb. per hr.

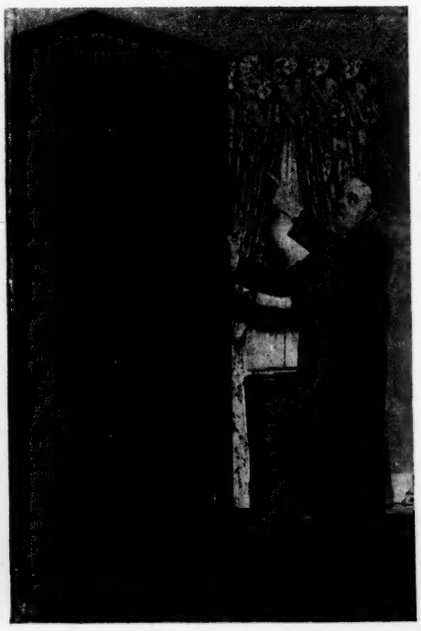
MADE BY — *The Herman Nelson Corp., Moline, Ill.*

Airtemp Air Conditioner

NAME—"All-in-one" summer air conditioner.

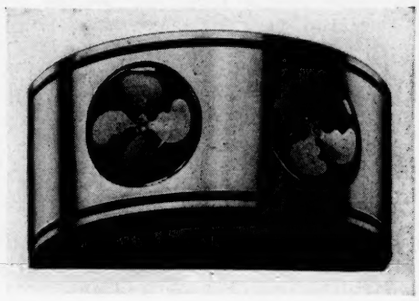
PURPOSE—A complete summer type air conditioning unit for shops, stores, and offices.

FEATURES—Manufacturer states that while the new unit has a 3-hp. capacity it is of such compact design that all machinery is contained in one cabinet which covers only 20 x 33 in. of floor space. The unit is 7 ft. 6 in. high and has a diffusion type grille near the



top. Approximately 1200 cu. ft. of air per minute can be circulated. The unit is semi-portable so that the merchant or shop owner can take it with him when he moves. Only electrical and water connections are required.

MADE BY—*Airtemp, Inc., New York.*



Peerless Air Conditioners

NAME—A floor type, ceiling type, and ceiling-suspension type comfort cooler, band box model.

PURPOSE—To supply cooled and dehumidified air.

FEATURES—Floor and ceiling models: refrigerant coils in these units are standard Peerless rifled tubing coils equipped with Equa-Lizer feed to ensure proper distribution of the refrigerant. The units are not equipped with filters, but may be used with any standard filter of adequate capacity. The band box model comfort cooler is designed for application in offices, shops, and homes. Incorporated in the cabinet are expansion coils and valves, a drip pan, motors and two fans. An all-aluminum case with black trim is used to house this equipment. Coils are furnished for three point suspension.

SIZES AND CAPACITIES—Floor and ceiling type units: 12 sizes with capacities ranging from 1 to 20 tons; band box comfort cooler, 4 sizes with capacities ranging from 9,000 to 24,000 B.t.u. per hr., cooling effect.

MADE BY — *Peerless Ice Machine Co., 515 W. 35 St., Chicago, Ill.*

Aeriet Model A Conditioner

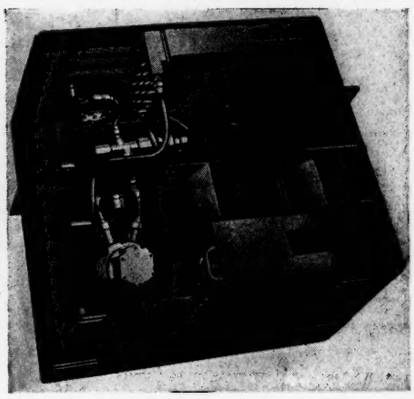
NAME AND MODEL NUMBER—Adco-Aeriet Model A air conditioner.

PURPOSE—Portable window units.

FEATURES—Has ½-ton V-8 compressor. Cools, filters, dehumidifies, and circulates air. Space between unit and sash frame is closed by side panels. Adjustable ½-hp. non-radio interfering refrigeration motor, expansion coils, air impeller, 1/20-hp. fan motor, condenser, coil, grilles, drawer containing filter element and cutout switch. Requires no plumbing connections.

SIZES AND CAPACITIES—½-ton cooling unit. Will condition room of size from 1,600 to 2,000 cu. ft.

MADE BY—*Air Devices Corp., 210 S. Clark St., Chicago.*



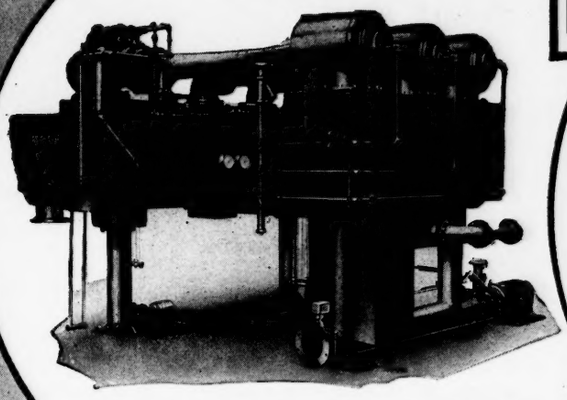
For air conditioning

You get EXTRA Advantages

when you install INGERSOLL-RAND

WATER-VAPOR REFRIGERATION

STEAM-JET COOLER TYPE



Water is cooled by direct evaporation under a vacuum maintained by steam-jet boosters. There are no moving parts except the pumps.

Exclusive I-R features insure reliability and ease of operation. Steam-Jet Coolers operate without noise or vibration. They are easier to install and maintain than any other type of refrigerating equipment.

Capacity, ten tons and upward, in standard sizes. Units can be furnished for any specified steam pressure.

CENTRIFUGAL UNITS

Water is cooled by direct evaporation under a vacuum maintained by a centrifugal compressor which is driven either by an electric motor or steam turbine.

Centrifugal water-vapor units are self-regulating; they float with the load. Power consumption decreases proportionately as the load is reduced.

Built in standard sizes for capacities of 100 tons refrigeration and upward.

WATER is the only refrigerating medium. There is no refrigerant to purchase or replace.

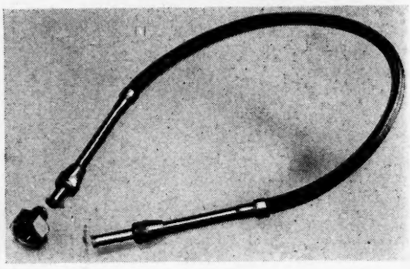
In addition, I-R Water-Vapor Refrigerating Units give economical performance at all loads, thus assuring low-cost refrigeration. They have unusual ability to handle overloads with a small increase in chilled-water temperature. Since there are no valves or pistons to cause wear, these units always retain their full capacity.

Ingersoll-Rand offers two types—Steam-Jet Cooler and Centrifugal—which permit the most advantageous selection of equipment to meet any conditions of steam or electric power, condensing water supply and refrigerating needs.

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Knoxville, Los Angeles, Newark, New York, Philadelphia, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY



York Flexible Charging Connection

NAME—York flexible charging connection.

PURPOSE—A flexible charging connection for use in charging Freon refrigerating or air conditioning systems.

FEATURES—Charging connection is 4 ft. long and is made of seamless bronze bellows tubing with a reinforcing armor of heavy bronze wire braid. It is provided with ⅜-in. S.A.E. flared nut connections at each end, with an adaptor fitting for connection to standard-size refrigerant cylinders.

MADE BY—*York Ice Machinery Corp., York, Pa.*

Poggel Catchdew Dehumidifier

NAME—Poggel Catchdew dehumidifier.

PURPOSE—For removing excess moisture from room air.

METHOD OF OPERATION—These units are designed for use in rooms such as printing press rooms where it is desired to lower the relative humidity. The manufacturer claims that excess moisture is absorbed from the air by electro-chemical action. The units are designed to be suspended from the ceiling and operated on either a.c. or d.c. current, 110 volts. Manufacturer states that each unit is capable of taking care of 800 sq. ft. of floor area.

MADE BY—*Advance Manufacturing Co., Inc., Louisville, Ky.*

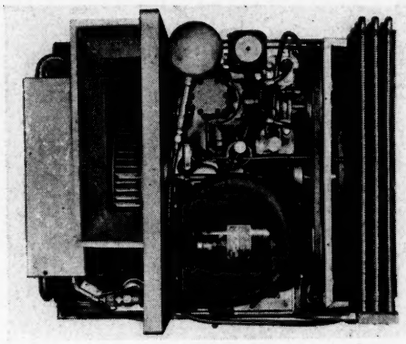
Thermal Units Window Type Cooling Unit

NAME AND MODEL NUMBER—Model V8 window type air conditioner.

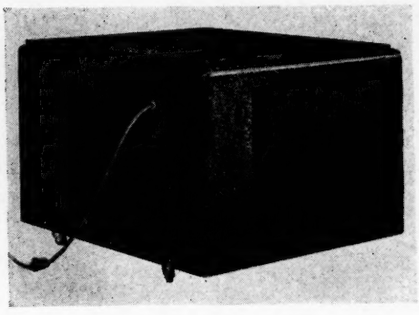
PURPOSE—Circulating, cleaning, cooling outside air for residential and commercial applications.

FEATURES—Can be plugged into convenient electrical outlet; requires no water or drain connections or ductwork to be installed in windows, the excess width of which can be blocked off with glass or wood.

DETAILS OF OPERATION—Return air is taken through large front grille shown at right of the illustration and discharged at the top of the unit. The window closes down over half of the cabinet just separating the high and low sides. There are two grilles with air intake to the condenser, one of which is shown at the left of the illustration. Outside air enters through these two grilles and discharged again to the outside air over the condenser, thus giving separation to the evaporator and condensing sections of the unit. Contains a V8 type cylinder compressor employing Freon refrigerant, blower fan and filter, as well as high side gage, oil tank and separator, strainer, and automatic high side cutout. A small water pump picks up moisture condensed by the evaporator leading it to a well beneath the pump intake; this water is then sprayed over the air cooled condenser to assist condenser cooling. Provided with casters so that it may be wheeled from room to room.



Interior of V8 window type air conditioner.



Cabinet which houses V8 unit.

SIZES AND CAPACITIES—For installation where not more than ½-ton capacity is required. Weighs 240 lb. Size 26 in. x 24 in. x 16 in., ½-hp. motor.

MADE BY—*Thermal Units Manufacturing Co., Chicago, Ill.*

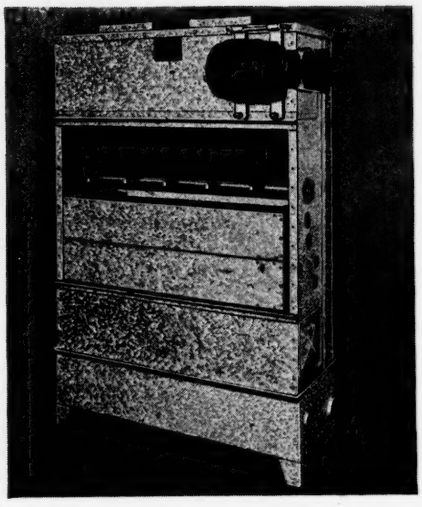
Graham Steam Ejector

NAME—Graham water cooler.

FEATURES—Steam ejector coolers of both surface condenser type and barometric condenser type. Where steam at any pressure is available with condensing water from rivers, cooling towers or wells, chilled water can be produced economically at temperatures down to 35F. Surface type generally used with cooling tower and spray pond; barometric type requires a barometric leg of 34 ft. and is adaptable to outdoor installation.

SIZES AND CAPACITIES—Surface condenser type in 12 standard frames for single booster type and eight standard frames for the double booster type with capacities ranging from 6 to 135 tons, depending on the steam pressure and chilled water temperature. Barometric type in frames with capacities ranging from 20 to 135 tons, depending on the steam pressure and chilled water temperatures.

MADE BY—*Graham Manufacturing Co., Inc., 220 Delaware Ave., Buffalo, N. Y.*



Buffalo Evaporative Condensers

NAME AND MODEL NUMBER—Type ECC evaporative condensers.

PURPOSE—For removing heat from compressed refrigerant by means of evaporation of water.

FEATURES—Copper tubes with copper fins, welded water tanks with casing and eliminators of copper bearing steel. Fan is of multi-blade type with ball bearings, removable section of the casing allows access to interior of unit. Arrangements of condensing coil provide for bleeding liquid as condensed.

METHOD OF OPERATION—Hot refrigerant gases from compressor pass through fin type coil where the heat of the refrigerant is removed by water sprayed over the exterior of the coils. The evaporation of the water furnishes the cooling.

SIZES AND CAPACITIES—Seven sizes for handling refrigerant from compressors with capacities ranging from 4½ to 52 tons of refrigeration.

MADE BY—*Buffalo Forge Co., Buffalo, N. Y.*

G.E. V-type Compressor Unit

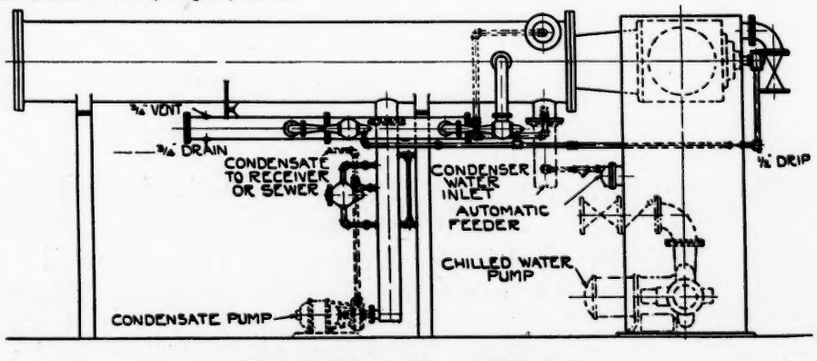
NAME—General Electric V-type condenser unit.

PURPOSE—Compressor unit for air conditioning system.

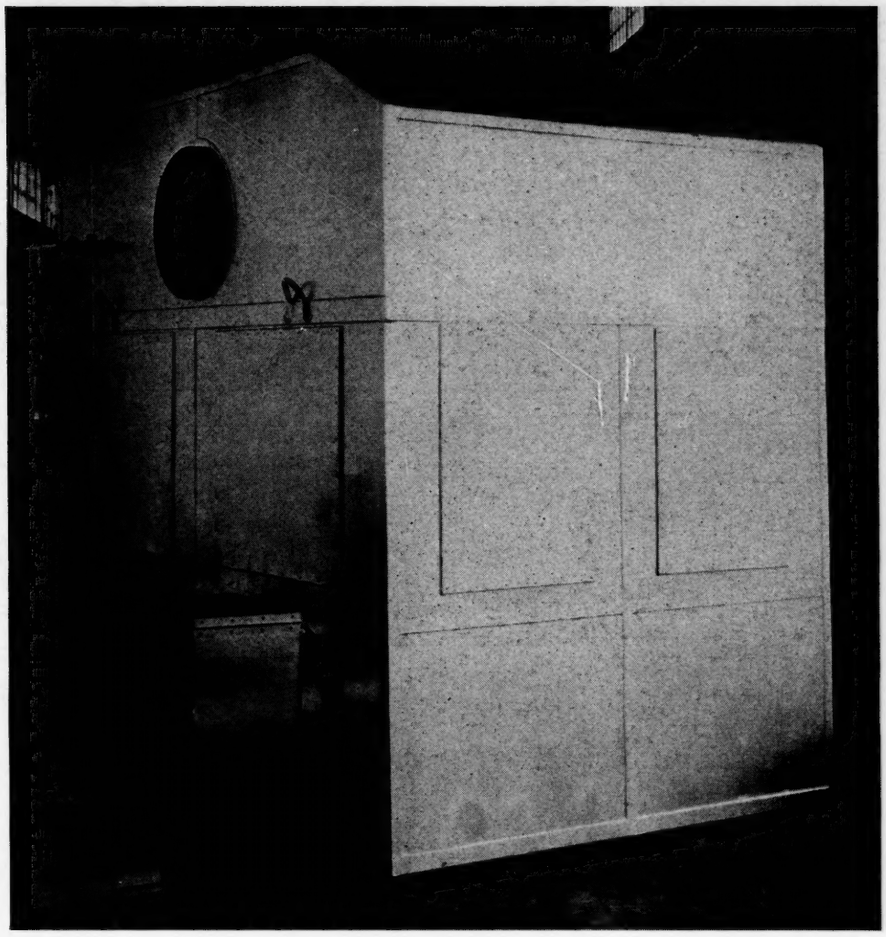
FEATURES—Unit is made up of compressor, electric motor, and condenser all mounted on one frame. Compressor is of V type with eight cylinders.

SIZES AND CAPACITIES—Refrigeration capacity equivalent to 40 tons of ice in 24 hr.

MADE BY—*General Electric Co., Bloomfield, N. J.*



Graham single booster—condenser type



THE

LECTRODRYER

"ACTIVATED ALUMINA SYSTEM"

FOR

AIR CONDITIONING

INDUSTRIAL — COMFORT

The LECTRODRYER is a unit for the reduction of latent heat in air conditioning installations. Moisture is removed from the air by a solid adsorbent—Activated Alumina.

NO LIQUIDS—NO CHEMICAL ACTION—NO REFRIGERATION IS INVOLVED

GAS—STEAM—ELECTRIC

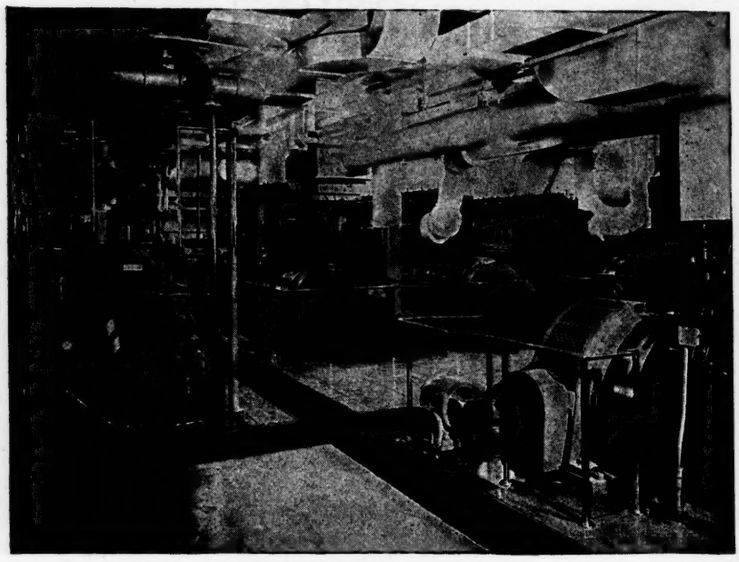
Standard sizes available with rated flows from 200 c.f.m. to 12,000 c.f.m. and with moisture removal capacities from 8 pounds to 500 pounds per hour.

Write for bulletins and further information

PITTSBURGH LECTRODRYER CORPORATION

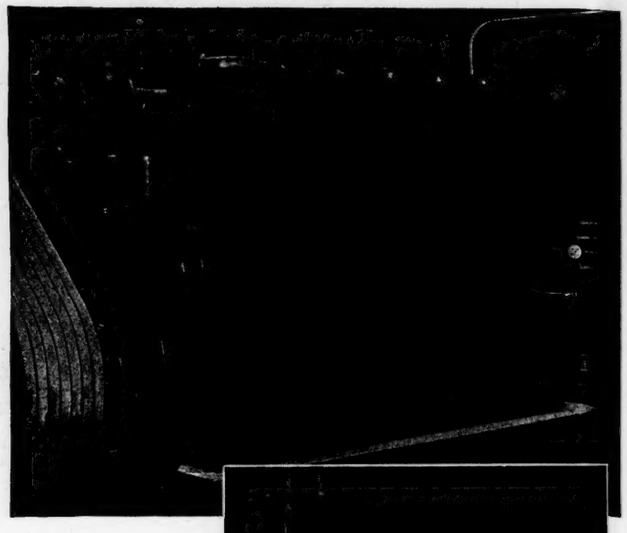
P. O. BOX 1257 + + + PITTSBURGH, PA.

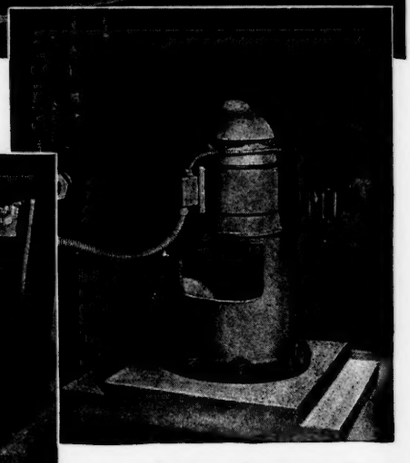
COMPLETE SERVICE . . .



A department store power plant . . . four 300-hp. and one 150-hp. Worthington Diesel Generator Units. At the left is a Carbondale Freon 12 Compressor, direct-connected to Diesel engine in tandem with generator, for refrigeration and air conditioning

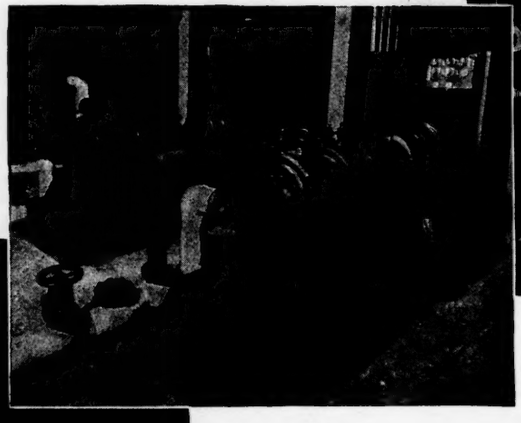
Worthington Gas Engine, with Worthington Multi-V-Drive, operating air conditioning equipment in a large mid-western office building

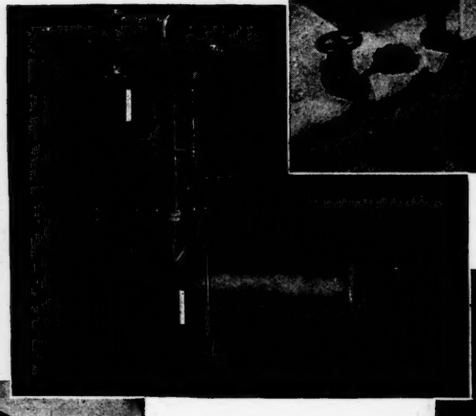




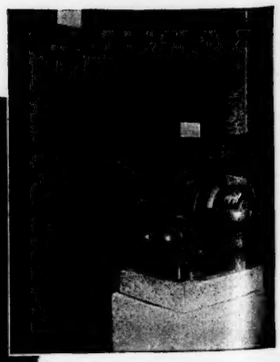
For general water supply . . . a Worthington Deep Well Pump

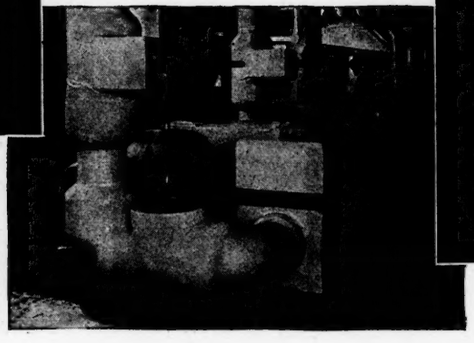
For building circulating water service . . . two Worthington Centrifugal Pumps





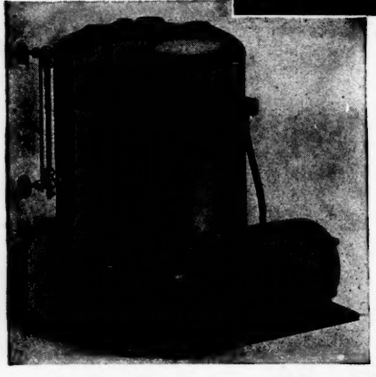
Worthington Deaerating Feedwater Heater in a hospital power plant





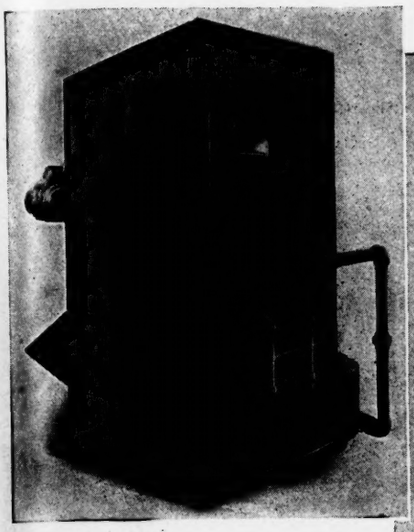
Worthington Centrifugal Pumps, for circulating cold water, in the air conditioning system of a large government office building

Ventilating fan with Worthington Multi-V-Drive

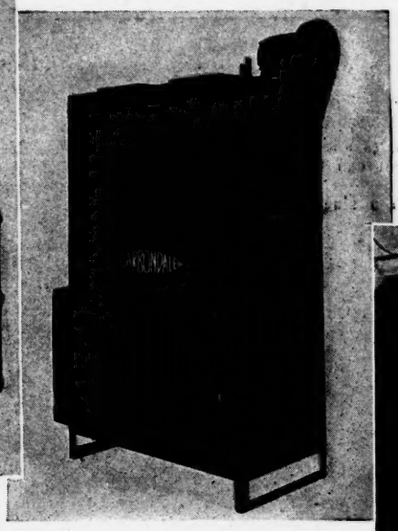


Worthington Condensate Return Unit . . . for building steam heating system

WORTHIN



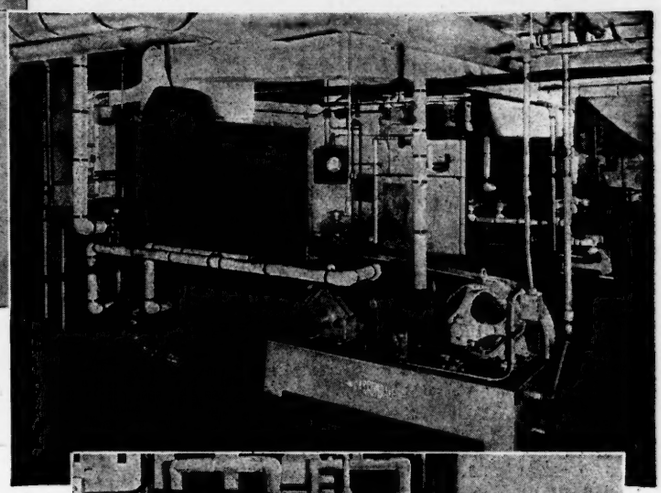
Carbondale Shower Condenser, a combined condenser, receiver and modified cooling tower, for air conditioning service... showing Worthington Monobloc Spray Pump on side



Carbondale Unit Air Conditioner, for a complete air conditioning job

CARBONDALE

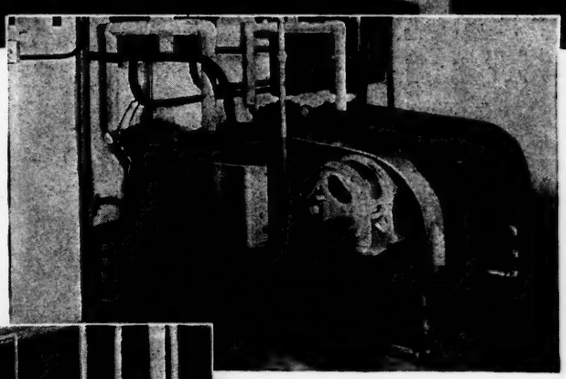
Carbondale installation for air conditioning the bar in a large hotel. Similar equipment for the coffee shop will be seen in background



with

UNDIVIDED RESPONSIBILITY

- AIR CONDITIONING
- REFRIGERATION
- WATER SUPPLY
- POWER GENERATION

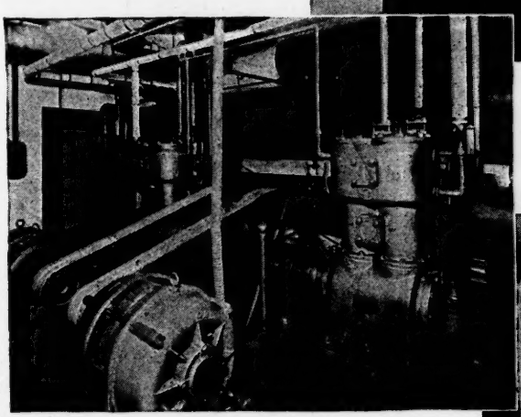


Two Carbondale Units furnishing cooled air and food refrigeration for a large restaurant

INDIVIDUAL equipment or complete plant installations . . . backed by the combined experience and facilities of Worthington and Carbondale.

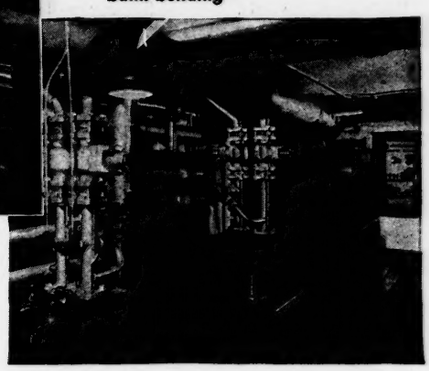
●

A competent engineering staff is available to analyze any application problem, and submit unbiased recommendations... without obligation.



Two large Carbondale Freon 12 Compressors, with Worthington Multi-V-Drive . . . part of the air conditioning equipment in a government office building

Two Carbondale Horizontal CO_2 Compressors, with Worthington Multi-V-Drive, for air conditioning a large bank building



WORTHINGTON PUMP AND MACHINERY CORPORATION

CARBONDALE MACHINE CORPORATION

Subsidiary of Worthington Pump and Machinery Corporation

General Offices: **HARRISON, NEW JERSEY** - Branch Offices and Representatives in Principal Cities throughout the World

Associated Companies in Austria, England, France, Germany, Italy and Spain

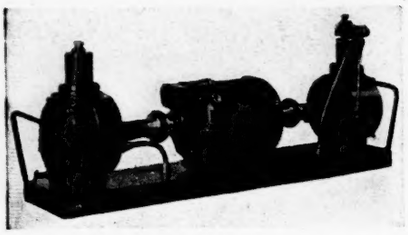
IC7-2

GTON-CARBONDALE

Beach-Russ Vacuum Pump

NAME—Beach-Russ vacuum pump.

PURPOSE—Used for evacuating refrigeration systems prior to introducing the refrigerant; for testing the tightness of refrigerating lines; also for testing for leaks when trouble has developed.



FEATURES—Portable unit with two vacuum pumps, both directly connected to one motor.

METHOD OF OPERATION — Both pumps may be operated in series to produce a vacuum within ½ mm. of absolute or in parallel to produce a vacuum within 1½ mm.

SIZES AND CAPACITIES—Two sizes available. One with a capacity of 1 c.f.m. (series) and 2 c.f.m. (parallel). Second unit 2 c.f.m. (series) and 4 c.f.m. (parallel).

MADE BY—*Beach-Russ Co., 50 Church St., New York.*

Modine Unit Cooler

NAME—Cold water type unit cooler.

PURPOSE—For removing heat and moisture from a room during the summer and for adding heat during the winter.

FEATURES — Unit is for suspension from piping and is equipped with a motor and fan which draws the room air through it. Can be turned in any direction without changing existing pipe connections. Any non-corrosive liquid can be used as a cooling medium—water, alcohol, or glycerine. During the winter low-pressure steam or hot water can be used.

MADE BY—*Modine Manufacturing Co., Racine, Wis.*

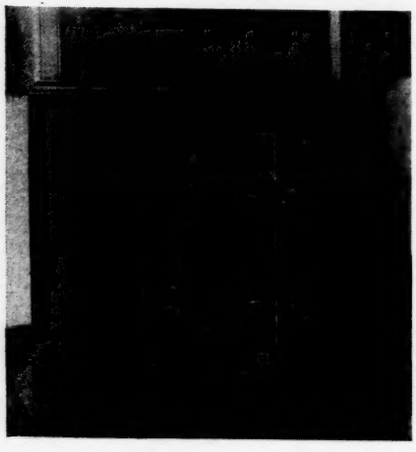
G-E Unit Air Conditioner

NAME AND MODEL NUMBER—G-E unit room air conditioner, type FC-2.

PURPOSE — Cools, dehumidifies, ventilates, and filters.

FEATURES—Does not require any special plumbing connections and can be plugged into any ordinary light socket. Has three small hermetically sealed condensing units. A telescopic duct is provided for carrying the heat and moisture from the room through a partly-opened window to the outdoors.

MADE BY—*General Electric Co., Bloomfield, N. J.*

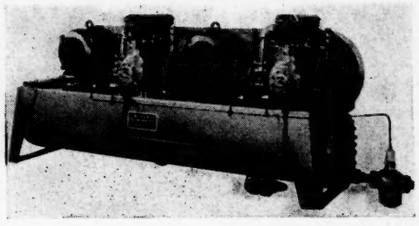


Baker Dual Condensing Unit

NAME—Baker dual condensing unit.

PURPOSE—For air conditioning.

FEATURES—Includes automatic capacity reduction so that unit can be operated at 40, 60, or 100% capacity on installations of 30 tons and less with a single condensing unit.



SIZES AND CAPACITIES—Three sizes, 20, 25, and 30 hp., using either two compressors with two independent motors or two compressors operating with one single motor, mounted in the center between the two compressors.

MADE BY — *Baker Ice Machine Co., Inc., Omaha, Neb.*

York Economizer

NAME—York Economizer.

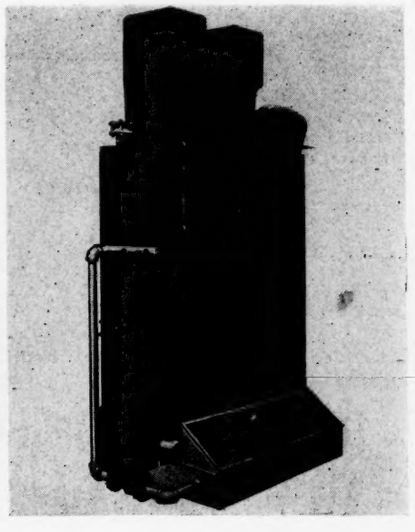
PURPOSE—Combination forced draft cooling tower and refrigerant condenser.

FEATURES—Arranged either for indoor or outdoor installation, being used indoors by providing ducts to bring in outside air and exhaust the heated, humidified air to the atmosphere.

DETAILS OF OPERATION — A fan passes the outside air through a bank of bare pipe coils over which water trickles in a direction opposite to the air flow, to give a Baudelot cooling action. Refrigerant is condensed inside the coils, and flows by gravity to the liquid receiver built in the base. Cooling water is recirculated from the drain pan by a pump driven by a fractional horsepower motor. The liquid receiver is made of seamless steel with a dished head, and is provided with a vortex eliminator to insure a minimum liquid level and maintain a liquid seal on the line.

SIZES AND CAPACITIES—Built in a number of standard models with capacities from 3 to 50 tons. Larger sizes are assembled to order in the field.

MADE BY—*York Ice Machinery Corp., York, Pa.*

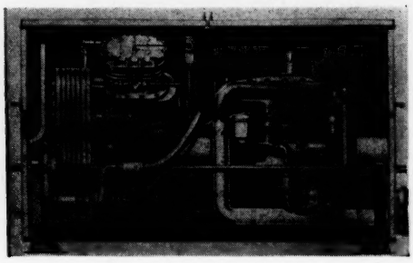


Waukesha Gas Engine Compressor

NAME—Waukesha gas operated "ice" engine.

PURPOSE—For summer air conditioning.

FEATURES — A refrigeration machine for heavy duty air conditioning which is driven by a gas engine, using manufactured or natural gas. The compressor and engine are built



as a single unit. Both are four cylinder, the latter being of the V type. Operation is automatic. Gas unit can be operated in connection with a tap water supply for condensing on the low-pressure side of the air conditioning system which can be connected to an evaporative type of condenser.

SIZES AND CAPACITIES—Equivalent to 7 tons of refrigeration effect. Engine has 20 available h.p. Compressor runs at 600 r.p.m., uses Freon or methyl chloride refrigerant. Unit enclosed in sound insulated cabinet measuring 56 x 27 x 35 in. Weight, 1,000 lb.

MADE BY — *Waukesha Motor Co., Waukesha, Wis.*

Frick Freon Units

NAME—Frick Freon refrigerating units.

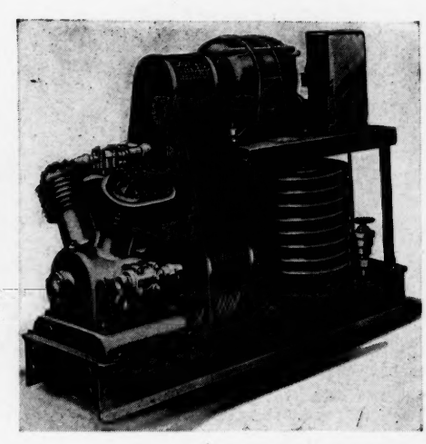
PURPOSE—For air conditioning and water cooling.

FEATURES—These units resemble in their general arrangement the standard ammonia refrigerating units which this firm has been building for years. The 15-ton machine has three vertical cylinders and is driven by a 15-hp. motor. The 20-ton unit has four cylinders, arranged in a V pattern, and is driven by a 20-hp. motor. The capacities given are based on a suction temperature of 40F. Both machines have cylinders of 4¼ in. bore by 4¼ in. stroke.

The condenser is a new type that gives extra cooling surface by nesting a number of small water tubes (instead of a single water tube) inside the large outer tube. The charge of refrigerant is carried in a receiver within the base, which is made of deep steel channels. The unit is complete with controls for automatic operation.

SIZES AND CAPACITIES—15-ton and 20-ton.

MADE BY—*Frick Co., Waynesboro, Pa.*



BALDOR BUILDS *Better Motors*

Where you find AIR CONDITIONING

you find BALDOR *Motors*

AIR-CONDITIONED PULLMANS ARE EQUIPPED WITH BALDOR MOTORS

When the manufacturers of Railway Air Conditioning equipment needed a sturdy dependable motor to withstand extra hard service, under all weather conditions, they chose Baldor Motors.

Baldor has specialized in motors for automatic heating and air conditioning service since the industry began and has pioneered and developed many important advances in motor design and engineering.

BALDOR ELECTRIC COMPANY
4300 DUNCAN AVE. - - - - - - - - ST. LOUIS, MO.
Sales and Service Offices in Principal Cities

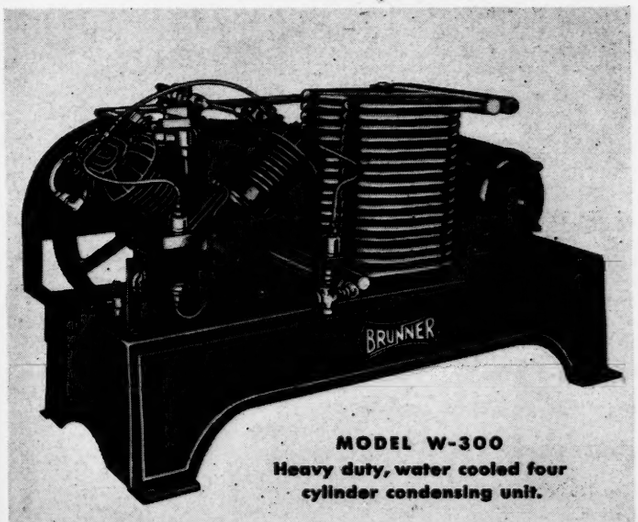
BALDOR
A BETTER MOTOR

Be Sure!
THE CONDENSING UNIT MATCHES!

Be certain the Condensing Unit you specify in your air conditioning installation matches the quality of your other equipment... Brunner Condensing Units have a universal reputation for dependability and embody structural improvements which reflect the newest advances in air conditioning... A wide range of models provide the exact capacity for all applications up to 15 tons of refrigeration.

Catalog upon request. Brunner Manufacturing Co., Utica, N.Y., U. S. A.

BRUNNER CONSULTING SERVICE
Brunner engineers are ready to cooperate with you in the selection of the correct condensing unit... No cost or obligation.



MODEL W-300
Heavy duty, water cooled four cylinder condensing unit.

BRUNNER
for Greater Dependability!

"V=200H"

Left—Servel Model WAV-2000.
Right—Servel Model H-25.

THAT'S an engineer's way of saying that Servel's big 20-ton unit is equivalent in cooling capacity to *two hundred* of its baby sister (shown beside it in the picture).

Servel's complete line covers the entire field of air conditioning and commercial refrigeration. Over forty practical, *merchandisable* models—each reflecting 15 years' experience in the designing and building of dependable low-pressure equipment—each meeting a definite demand.

Take the "X" out of your profit equation by selling Servel products. Good engineering, intelligent merchandising and careful installation deserve the added assurance of *proven performance* in your compressor equipment.

SERVEL, INC.—Electric Refrigeration and Air Conditioning Division.—Evansville, Ind.

SERVEL
Refrigeration and Air Conditioning

AIR CONDITIONING NOZZLES

Nozzles of unique Yarway Involute Design.

No internal parts or vanes to clog or erode.

Insure trouble-free air washing service.

Sizes and types for all requirements.

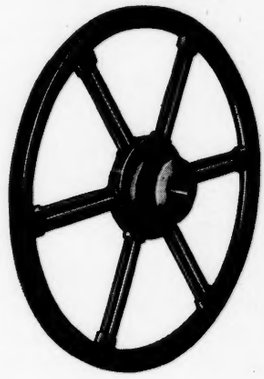
Many large users—installations total more than 5 million gallons per minute in water cooling and air conditioning service. Write for Bulletin N-615.

YARNALL-WARING COMPANY
104 MERMAID AVE.
PHILADELPHIA

YARWAY

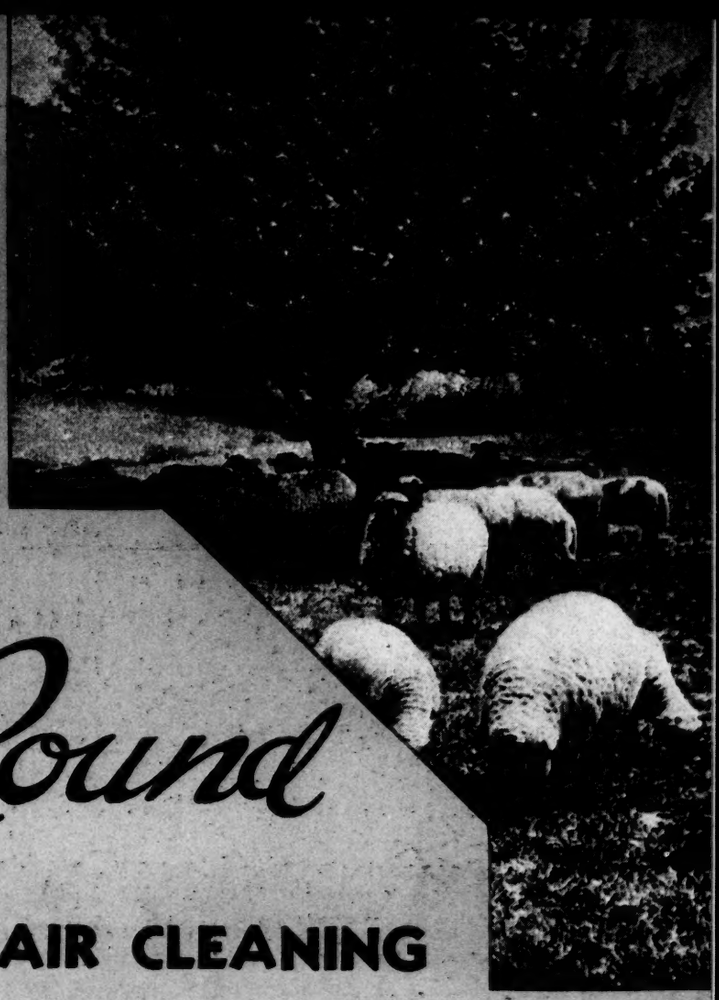
PULLEYS
Designed for Air Conditioning

★ True Running
★ Rugged Construction
★ Smooth Finished Grooves
★ Smooth, Quiet Operation



Diamond bored .... Balanced .... Stock of 500,000 .... Fits the Belt .... Gray finish .... 1 1/2" O.D. to 14" O.D. Also, four sizes of VARIABLE SPEED PULLEYS. Sample pulleys available for tests—bore size and diameter necessary.

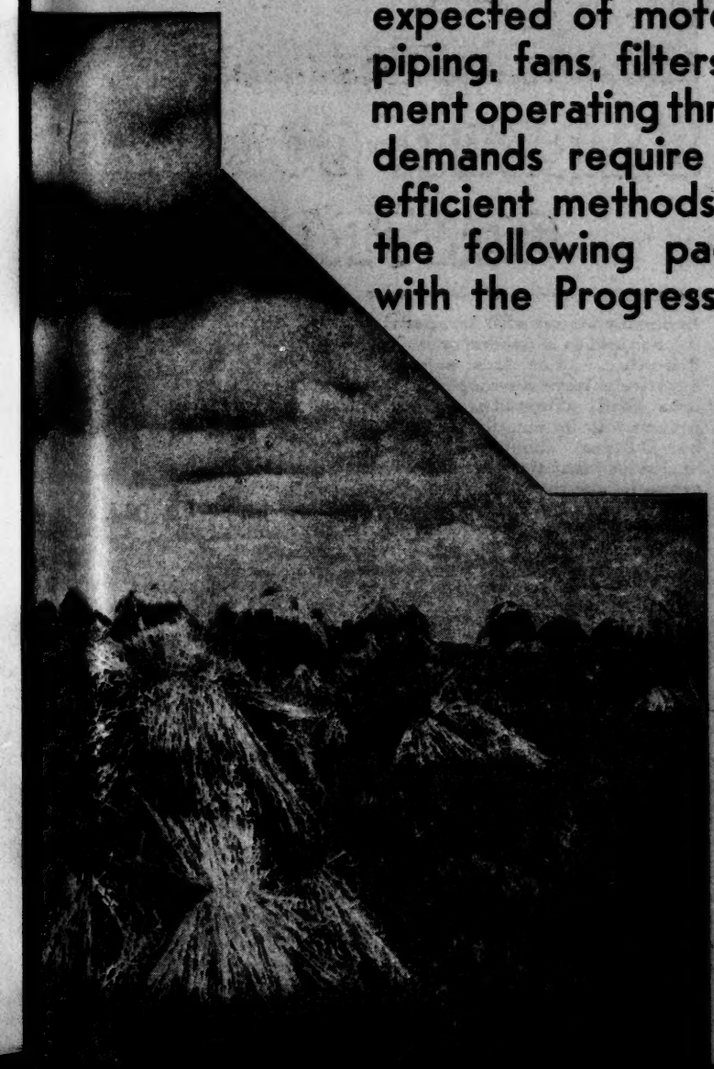
CONGRESS TOOL & DIE COMPANY
9031 Lumpkin Avenue
DETROIT, MICHIGAN, U. S. A.



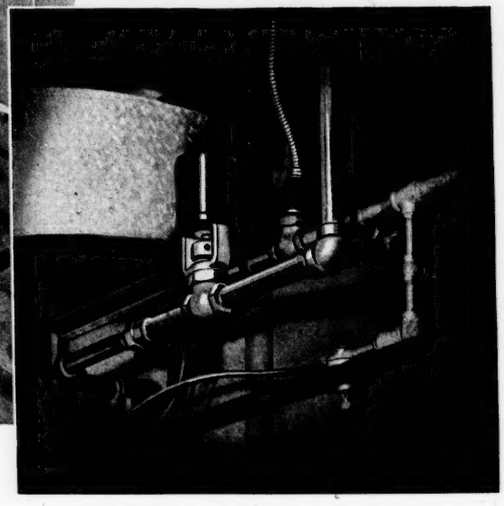
Year 'Round

VENTILATION *and* AIR CLEANING

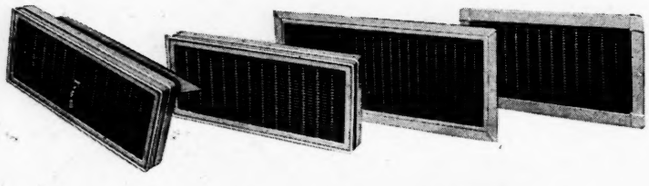
To provide a constant flow of air, to maintain its cleanliness and purity, much is expected of motors and belts, of ducts, piping, fans, filters, washers—of all equipment operating throughout the year. These demands require sturdy equipment and efficient methods which, as illustrated on the following pages, are keeping step with the Progress of the Industry.



Corner of a new suite of offices recently completed in a manufacturing plant. Year-'round air conditioning is included.



IN YEAR-'ROUND air conditioning installations the exclusive **UNI-FLO** diffusing and directional fin construction offers a number of outstanding advantages: (1) Permits higher air velocities and greater air temperature differentials, resulting in fewer and smaller grilles and ducts. (2) Produces a highly diffused air stream, eliminating drafts and obtaining a more complete and rapid tempering of the supply air. (3) Directs the air flow in accordance with the space size and contours. In addition, there are many other features and a comprehensive selection of units. Are you fully acquainted with **UNI-FLO?**



BARBER-COLMAN CONTROLS

Accurate automatic temperature and humidity control is a necessity in Year-'Round Conditioning. For this service Barber-Colman engineers have developed a number of ingenious and successful circuits characterized principally by simplicity and reliability. Barber-Colman Electric Controls have several exclusive features which make possible extremely accurate results with a minimum of control units, and the range of sizes and variety of apparatus is so broad that practically every control problem can be quickly solved with a simple selection of standard valves, thermostats, hygrostats, and damper motors. Send for descriptive literature.

BARBER-COLMAN COMPANY

FOR FURTHER INFORMATION SEE OUR CATALOG IN SWEET'S

ROCKFORD, ILLINOIS

uni-flo GRILLES *and* REGISTERS

Equipment Sales Doubled in 1936

IT is becoming increasingly common to regard as "year-round" those functions which do not apply specifically to either the summer or the winter season alone. This viewpoint is followed here and these functions and the equipment used to accomplish them form the subject matter of this section. Important among these functions are those of distribution, motion, and purification. All of these have their own peculiar problems in such an array that all cannot be even touched on in limited space. Attention is directed especially to those in which definite progress was made during 1936 in ways which will permit discussion.

Statistical Position

Important as a key to commercial progress, although never telling the full story, are statistics showing sales volumes in those items of equipment where such figures are available. The statistical situation permits presenting only a few of the items. These are shown in the pictographs on page 87 and as Tables 1Y to 10Y on page 83. As an aid to visualizing these figures, three charts are also included on page 83. The figures here presented are for the years 1935 and 1936 only since comparisons between these two years are enlightening. Similar figures for previous years were shown in HEATING & VENTILATING for January, 1936, and readers who wish to examine the record for a long period of years are referred to that issue.

Many interesting points can be brought out by a careful study of these statistics, for while they are far from complete still they show trends. They may be extremely useful for analytical purposes but should not be overworked or overweighted.

When the total sales of all the items shown in the pictographs are compared for the years 1935 and 1936 it will be found that the sales volume in dollars was almost 100% greater in 1936 than in 1935. Here is positive evidence that the year-round equipment certainly made strides in the last twelve months.

It is also interesting to note that reported volume of sales of propeller fans nearly tripled, while those of small housed blowers increased nearly 150%. These items therefore moved ahead in volume of sales much faster than did the others. As there were no known changes in design or selling methods which would account for such large increases it is concludable that these devices found their way into new or expanding markets to such an extent as to produce a considerable part of the added volume.

Other items of year-round equipment for which data are at hand, and which showed large gains in 1936, are air washers (for which sales rose 43%) and indirect surface. During 1936 sales of nonferrous indirect surface twice surpassed the previous all-time high records, with indications as the year closed that sales would total about $1,850,000, an increase of 57% over 1935. Cast iron surface showed a still larger gain, the rate of increase being 65%.

Association Activities

An interesting development during 1936 was the concern manifested over the definition of air conditioning. A year ago the Air Conditioning Manufacturers Association succeeded in selling the National Better Business Bureau on the idea of publishing a set of definitions of air conditioning. These included one on year-round air conditioning, and listed as the minimum performance of year-round equipment the following: the air must be cooled and dehumidified in summer, it must be heated and humidified in winter, and (presumably during all seasons) it must be circulated. During the year Air Conditioning Manufacturers Association devoted some effort to obtaining general acceptance for this as well as other definitions of air conditioning. Other activities of this organization are described elsewhere in this issue.

Another association active during the year was the National Association of Fan Manufacturers. Among the activities of this group was a most unusual one, and one that engineers and contractors would, we believe, welcome from every group of manufacturers. This association published a comparison chart of the different size fans as made by the ten member manufacturers, so that the user can determine at a glance the identifying number of fan of each maker for a given job. So far as can be recalled, this is the first time any group in the heating and air conditioning industry has ever published such a comparison of its own equipment.

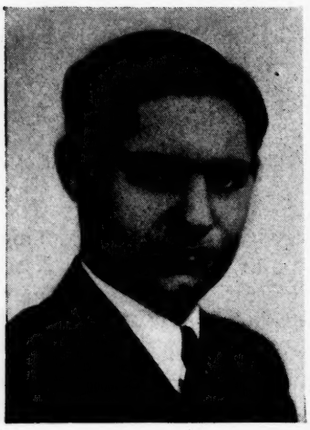
Future Trends

Progress was reported in what might be termed laying the foundation for year-round conditioning. In some sections, notably New England, a number of installers of winter equipment, especially oil-fired units, adopted as standard practice the idea of making provision for later installation of summer cooling equipment. This has been especially true in connection with warm-air type units. At the same time manufacturers of oil-fired winter units have been giving the addition of summer cooling enough attention so that informal arrangements have been made for the exchange of technical information between members of Oil Burner Institute and the Air Conditioning Manufacturers Association.

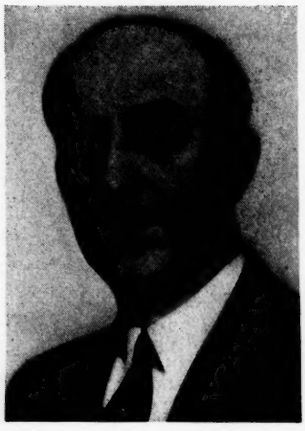
Prospects

The outlook for the fan business is especially promising now that fans are being included so generally in both heating and cooling installations regardless of the methods of heating or cooling used. There is every reason to expect that the fan business will continue to show percentage gains greater than those shown by the industry as a whole during 1937.

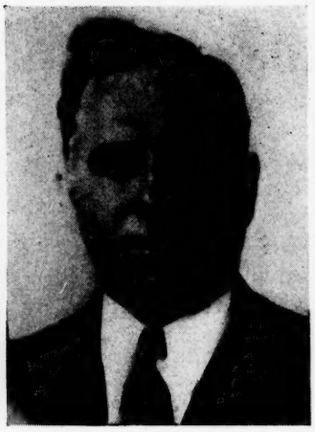
For the longer pull it is encouraging to note that with the expansion in the building industry last year, the level of activity stands at only 41% of that experienced in 1929. There is thus plenty of prospects for growth in building construction.



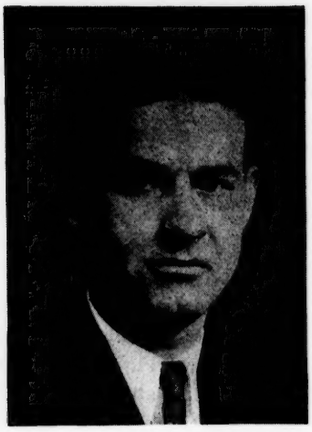
Millard F. Willis, Texas Bureau of Air Conditioning and Standardization, Dallas, Tex.



John J. Calnan, President, Plumbing and Heating Industries Bureau, Chicago, Ill.

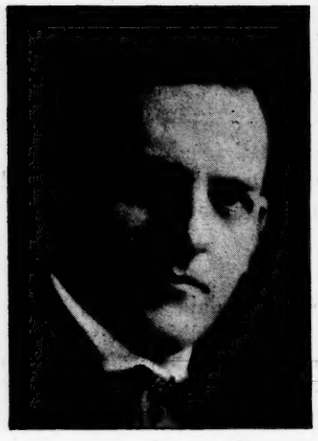


Sullivan A. S. Patorno, Consulting Engineer, New York, New York.



W. H. Junker, Chief Mechanical Engineer, Emery Industries Inc., Cincinnati.

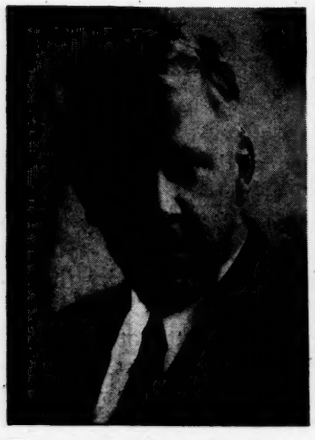
Contributors to A Year of Progress



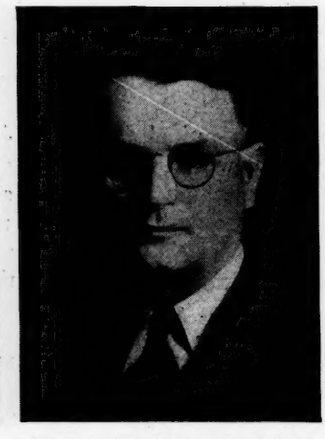
J. D. Colyer, President, Refrigeration Supplies and Parts Manufacturers Association, Wolverine Tube Company, Detroit, Mich.

Anthony Menke, President, Air Conditioners Association of New Jersey, Menke Air Conditioning Co., Newark, New Jersey.

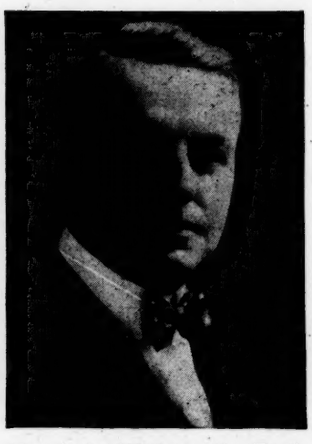
J. Lawrence DeNeille, President, National Bureau of Heating and Air Conditioning, Eichler Heating Co., St. Louis, Mo.



Thomas Chester, Engineer and Contractor, London, Eng.



John I. Easterly, Architect, Santa Rosa, Calif.



Frank L. Wadsworth, Engineer, Rochester, N. Y.

Edward P. Zelnis, Mechanical Engineer, Chicago, Ill.

MONTHLY EQUIPMENT SALES

YEAR-ROUND AIR CONDITIONING

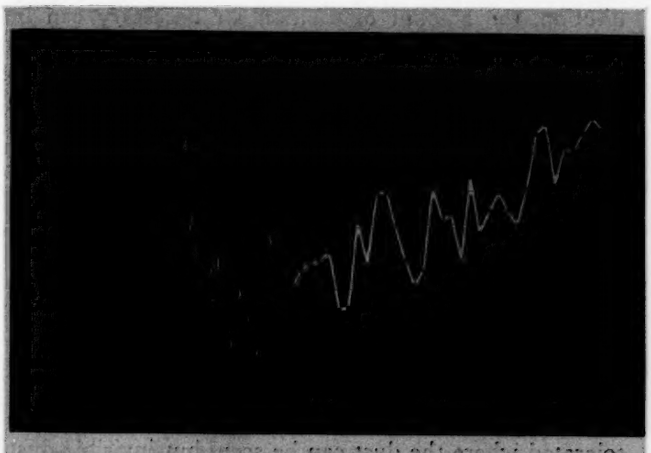
1936 vs. 1935

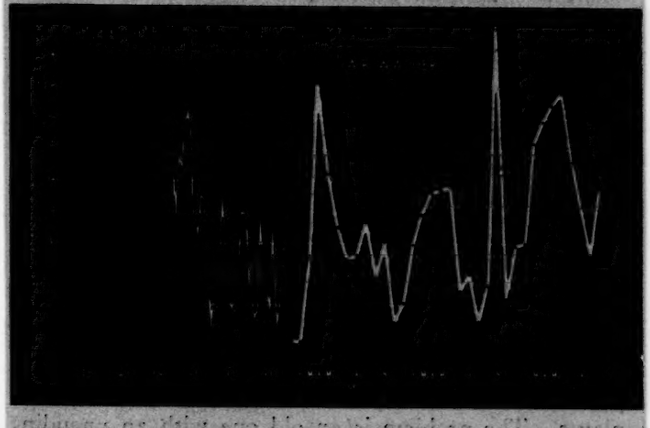
Table 1Y—Large Ventilating Blowers
(Sales in Dollars)

	1935	1936
January	$ 60,571	$ 88,308
February	29,181	105,753
March	73,023	178,453
April	112,226	195,756
May	109,330	160,342
June	111,716	135,831
July	81,218	139,386
August	64,883	140,345
September	67,322	133,362
October	62,889	147,963
November	136,496	—
December	90,836	—
TOTAL	$999,691	—

Table 2Y—Small Housed Blowers
(Sales in Dollars)

	1935	1936
January	$ 42,070	$104,708
February	42,977	65,687
March	49,289	67,638
April	43,425	99,391
May	48,866	120,943
June	48,872	149,068
July	58,285	146,627
August	57,277	162,243
September	51,267	155,310
October	62,723	147,051
November	51,205	—
December	69,381	—
TOTAL	$625,637	—





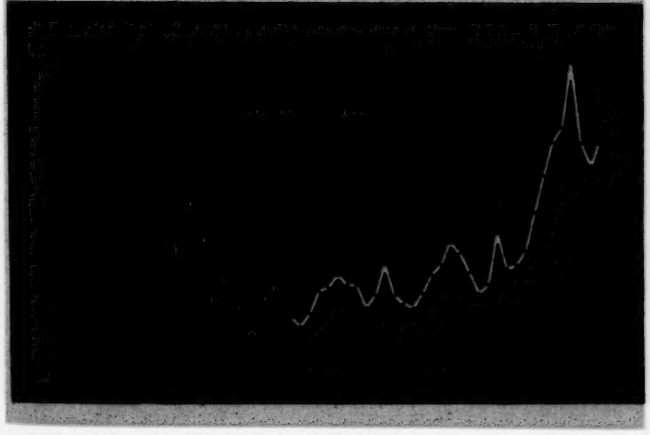


Table 3Y—Propeller Type Fans
(Sales in Dollars)

	1935	1936
January	$50,670	$ 77,359
February	61,110	136,360
March	67,708	169,410
April	88,879	225,890
May	124,118	366,804
June	165,114	395,053
July	217,368	600,534
August	128,196	332,278
September	68,043	284,428
October	86,102	280,346
November	120,937	—
December	91,502	—
TOTAL	$1,269,747	—

Table 4Y—Blower Motors Sold Separately
(Sales in Dollars)

	1935	1936
January	$ 42,762	$48,560
February	45,210	55,926
March	37,447	69,849
April	43,505	84,274
May	37,679	63,324
June	67,137	80,639
July	35,645	85,248
August	44,739	72,293
September	41,281	62,102
October	43,873	132,074
November	112,485	—
December	55,583	—
TOTAL	$607,346	—

Table 5Y—Steel Heat Transfer Surface
(Sales in Dollars)

	1935	1936
January	$ 438	$2,473
February	1,319	6,039
March	3,534	1,291
April	1,749	—
May	2,331	1,242
June	1,091	558
July	1,527	2,896
August	2,102	—
September	513	1,188
October	1,990	3,848
November	774	—
December	851	—
TOTAL	$18,219	—

Table 6Y—Cast Iron Heat Transfer Surface
(Sales in Dollars)

	1935	1936
January	$7,991	$11,176
February	10,042	9,217
March	1,411	28,399
April	3,670	13,532
May	13,155	5,546
June	10,968	7,107
July	6,491	13,892
August	16,035	11,896
September	4,099	17,392
October	5,886	13,662
November	6,997	—
December	18,489	—
TOTAL	$105,234	—

Table 7Y—Non-Ferrous Heat Transfer Surface
(Sales in Dollars)

	1935	1936
January	$76,561	$ 95,402
February	59,210	117,228
March	74,866	138,736
April	127,638	160,956
May	96,881	128,459
June	102,598	151,195
July	88,055	141,652
August	121,706	155,856
September	98,267	159,168
October	111,287	153,364
November	122,210	—
December	98,286	—
TOTAL	$1,177,565	—

Table 8Y—Total Heat Transfer Surface
(Sales in Dollars)

	1935	1936
January	$84,990	$109,051
February	70,571	132,484
March	79,811	168,426
April	133,057	174,488
May	112,367	135,247
June	114,657	158,860
July	96,023	158,440
August	139,843	167,752
September	102,879	177,748
October	119,163	170,874
November	129,981	—
December	117,626	—
TOTAL	$1,301,018	—

Table 9Y—Air Washers
(Sales in Dollars)

	1935	1936
January	$20,369	$39,357
February	39,685	39,746
March	49,251	71,673
April	56,009	79,160
May	57,644	84,402
June	58,614	87,970
July	24,350	65,738
August	30,320	51,916
September	14,870	36,217
October	26,358	57,247
November	108,856	—
December	22,025	—
TOTAL	$508,351	—

Table 10Y—Air Filters
(Sales in Dollars)

	1935	1936
January	—	$17,634
February	—	15,213
March	—	43,701
April	—	19,137
May	—	21,363
June	—	12,430
July	—	11,648
August	—	11,531
September	—	14,952
October	—	23,745
November	—	—
December	—	—
TOTAL	—	—

Engineering Problems Faced During 1936

BEHIND the equipment always lies a long record of developments of an engineering and technical nature. Some of these deal with the actual design and production of the equipment itself and others have to do with problems of application. Progress was made during 1936 in connection with both of these.

The Odor Problem

Air carries odors which are often a nuisance and their removal, or else their reduction to levels where they are inoffensive, is greatly desired. In some cases it is imperative. In most cases where there are odors there is a problem.

There are three recognized methods of approaching the solution. One is to dilute the odorous air with enough odor-free air to reduce the odor to a point where the resulting mixture is suitable for its intended use. A second is to remove the odorous substance from the air and thereby remove the odor. The third is to introduce into the air a pleasing odor in such concentrations that the unpleasant odor is covered up.

The third method is not in good repute. No particular progress was noted in connection with it during the year for it has but little engineering connected with its application, and methods were long since worked out.

For some time the method of dilution has been in much favor, especially where human odors are involved. Where humans are crowded into limited spaces, as in theaters, auditoriums, restaurants, and schoolrooms, operating economy demands that the air be used without dilution from the outside but odors become excessive unless diluted or removed. The problem is to find the minimum dilution with outside air which will reduce odors to suitable concentrations.

During 1936 information appeared which tends to strengthen the practice of using a relatively smaller amount of dilution air per person than was formerly thought necessary (see HEATING & VENTILATING, March, 1936, pages 31-35). It appears that for rooms where crowding is not excessive 15 to 20 cu. ft. per person per minute of outside air can be expected to reduce human body odors to suitable levels of concentration. The 30 cu. ft. per person per minute formerly used seems necessary only where there is crowding or where there are worse than average conditions. It is doubtful if these findings affected practice generally for there is general confusion and much difference of opinion still existing. Appearance of definite data constitutes progress toward a more uniform and more rational fixing of the air dilution quantity. The diversity of opinion is especially apparent when quantities used in winter are compared with those used in summer installations. Rationalization remains as a problem for 1937. It can be anticipated that the summer quantities will be increased and the winter quantities reduced.

Solving the odor-in-air problem by removing the odorous substances from the air is not a new approach. It has been repeatedly suggested and practiced. One method has aimed at oxidation or at removing odorous substances by changing their chemical nature. Another has aimed at removing odorous gases and solids by passing the odor-laden air through a washer. The washer can remove gases soluble in water and those condensible by cooling to the water temperature. Washers or air filters can also remove solid odorous substances which may be carried in the air stream.

During 1936 an odor filter constructed in a fashion similar to unit air filters appeared on the market. It accomplishes odor removal by adsorption. The odorous air is passed across a bed of activated coconut shell carbon which has the property of adsorbing and holding condensible gases and vapors which come in contact with it. This method constitutes a part of the year's progress.

Where odor removal is practiced together with air dilution, the amount of dilution air necessary can be reduced to a minimum, and maximum recirculation and greatest operating economy should result. Whereas odor is now usually the consideration which fixes the amount of ventilation air necessary for human comfort when odor removal is not practiced (see HEATING & VENTILATING, October, 1935, page 54), if both odor removal and dilution were used in combination the amount of outside air might approach the vanishing point.

Cleaning, Washing, and Filtering

Removal of solids, especially dust, from the air in buildings of all kinds is one of the year-round functions of vital importance. Dusty air is usually not tolerated where the dust can be seen, but invisible dust can damage stocks, people, machinery, and products.

The record for 1936 does not show any notable progress in new methods of elimination, removal, or control. Catching dust on wet surfaces, on adhesives, on dry fabrics, or on electrically-charged surfaces, thus taking it out of the air stream, are now well established. Dust traps and separators which use centrifugal force or gravity as a means of separating dust from air are also in wide use. Product engineering as applied to these methods is taken up later in this section.

Industrial Dust

The year was marked by a revival of interest in problems connected with dust in the air in industrial plants. The problem is an old one with an unending number of ramifications. During 1936 that particular phase which deals with the health hazard arising from dust in factory air received special attention.

Naturally this attention focused on silicosis, known to be caused by exposure to silica or sand dust in the air. The disease develops slowly and there is no known cure for it. Because of the obscurity of the causes, confusion regarding the legal liabilities of an employer, and failure to recognize it as an occupational disease, there were employe lawsuits. These were often hard-fought, expensive, and the outcome was uncertain to both parties. The result was a very pressing problem. Among its phases is that of prevention, which means keeping the employe from breathing silica dust in con-

centrations which will bring on the disease. One way, and a very important way, of accomplishing this desired result is through the use of local exhaust ventilation. The aim is to remove the dust without permitting it to get into the general room air and be breathed.

A National Conference on Silicosis was called by the United States Department of Labor early in May. Committees were appointed, among them one on engineering to deal with the technical question of prevention. No report of this committee appeared.

Three anti-silicosis bills were enacted by the New York legislature and became laws in June. It is interesting to note that one of these authorized $50,000 per year for the next five years for making studies of methods of preventing dust diseases and for devising methods of preventing dust hazards. This fund insures means for giving close study to the problem. Test procedures were formulated covering certain appliances and field tests in rock quarries were reported from New York late in the year.

In Illinois there became effective on October 1 a Workmen's Occupational Diseases Act modelled after compensation laws and which sets up employer insurance against the hazards of an employe contracting silicosis.

Further evidence of the interest of the public is the large number of states which now have an organization for giving attention to the problem. During the year it was reported that 17 of the states now have such divisions or bureaus equipped with medical and technical staffs.

This attention to silicosis has also served to heighten and revive technical interest in other phases of the industrial dust problem and in exhaust ventilation.

Indicative of this interest is the appearance of the Air Hygiene Foundation, which was incorporated in Ohio in December, 1935. It is an organization of and for industry formed for the purpose of investigating the industrial dust problem, conducting researches and studies, and putting out its findings and other information bearing on the problem. During the year its program was formulated and includes maintaining a fellowship at Mellon Institute to conduct researches on industrial dusts and fumes. The foundation is also engaged in collecting all published information on the subject. A committee on engineering was organized to recommend procedures and to determine what specific studies should be undertaken in order to obtain suitable engineering. The foundation also aims to cooperate with all other agencies on the industrial dust problem.

Late in the year the engineering committee under the chairmanship of Prof. Philip Drinker presented its report. It advises that engineers in the dusty trades can and should cut heavy dust concentrations below the present limits warranted by medical knowledge. This action is important, the report explains, not only to further safeguard the health of workmen but to give employers the maximum protection against unjust claims. It is thought by the committee that dust control, for hygienic reasons, should be aimed at the fine rather than the coarse particles. The committee also asserts that many firms have neglected heavy dust concentrations in cases where the dust is of no proven harm, and adds: "There is no satisfactory medical answer at present to this question, but the engineer is making a bad mistake if he lets men breathe heavy dust concentrations of any material. If no other reason for dust control can be found, then one should read transcripts of some of the recent suits at common law in which fantastic damages for alleged silicosis were granted to men who breathed dust containing little or no silica. The courts and compensation boards are not impressed with subtle distinctions between dusts with 10% and 40% quartz, especially when medical experts are reluctant to make definite statements as to the comparative significance of such differences.

"It would be well to realize that men working in dusty trades suffer far more from respiratory troubles of all kinds than do men who work in clean air. The evidence that excessive dustiness of any kind is harmful is beyond argument."

The committee attributes the handicap in this general field to the lack of fundamental data and recommends a number of specific engineering researches for the foundation to undertake in the coming year.

The accompanying table is included in the report and lists the comparatively meager data available for the scientific design of hoods, although the committee advocates studying each installation with the help of experimental hoods and a portable blower. Lacking good design data, hoods must necessarily be proportioned and constructed by trial, a procedure which does not achieve the results obtainable with good engineering.

Absence of definite standards of practice other than those contained in rules formulated by various state industrial boards has been recognized as a hindrance for some time. American Standards Association has undertaken to prepare a safety code for exhaust systems

MINIMUM AIR VELOCITIES REQUIRED TO CAPTURE CERTAIN INDUSTRIAL DUSTS

Industry	Process	Required Air Velocity		Criterion
		At Point of Origin	At Face of Hood	
Granite cutting.	Hand pneumatic tool	220 f.p.m.	—	R
	Surfacing machine	1500 f.p.m.	—	R
	All tools	—	1500 f.p.m.	R
Grain elevators.	Elevator boot & head garner	—	500 f.p.m.	V
Paint spraying..	Spraying booth	—	50-200 f.p.m.	R
Sand pulverizing.	Bagging machine	400 f.p.m.	—	R
Electric welding.	Electric welding	100-200 f.p.m.	—	V
Quarrying and mining.....	Horizontal drilling with Kelly-Hatch trap	60*	—	R
	Vertical drilling with Kelly-Hatch trap	200*	—	R
Electric plating..	Chromium plating	50**	1500 f.p.m.	R
	Steam to acid tanks	75-100 f.p.m.	—	R
Hatters' fur.....	Brushing	200*	—	U
	Cutting machines	380*	—	U
	Blowers	2000*	—	U

*C.f.m.

**C.f.m. per ft. of slot (common practice).

Recommendations as to hood design, requisition velocities, and the like, can now be obtained from the appropriate departments of many states, some of which embody these recommendations in codes. R = Reduced concentration to safe level; V = Visual test; U = Usual practice.

and has designated the project as Z9. Preparation of this code is under the sponsorship of the International Association of Industrial Accident Boards and Commissions. The ultimate object is to prepare a code for adoption as an American Standard. The scope of the project has made it necessary to subdivide the work. During the year a subcommittee on Fundamentals prepared a report which appeared late in the year under the title: "Fundamentals Relating to the Design and Operation of Exhaust Systems." This report, available in pamphlet form (through ASA, price 40 cents), attempts to assemble the fundamental concepts and data now available and shows how they influence the design of exhaust systems. The committee recognizes the necessity of treating each industrial problem as individual and hence makes no attempt to go beyond the fundamentals which govern all installations. The report is labelled "preliminary" and it is hoped that the material will receive critical study and that comments based on it will assist in formulating a more permanent future report.

Dust Explosions

Combustible dusts such as those resulting from certain processes performed on wood, on coal, on starch, on flour or feed, grains, sugars, or spices can form explosive mixtures with air. Handling of such dusts by exhaust systems is another phase of the industrial dust problem. Safety codes intended to minimize the risks in such places have been in existence for several years. During the year Bulletin 617 of the Bureau of Labor Statistics, United States Department of Labor, appeared with additional and revised codes. These codes are American Standards. The bulletin is obtainable from the Superintendent of Documents, 10 cents.

Revision of Fire Protection Code

In order that safety codes for exhaust systems may cover the fire hazard they frequently refer to regulations of the National Board of Fire Underwriters for the installation of power operated ventilating, air conditioning, dust, stock and vapor removal systems. A revision of these regulations appeared, was published late in the year, and was reprinted in full in HEATING & VENTILATING, December, 1936, pages 39 to 42. These new regulations are revised from those appearing in 1929, contain a number of innovations, and their appearance contributed to the year's progress in the engineering of industrial exhaust systems.

Bacteria in Air

For a long time there has been little agreement regarding many phases of the subject of disease-producing bacteria in air. Some have believed that harmful bacteria do not live in the air itself but that they may live on impurities in atmospheric air such as dust or vapor particles. Others steadfastly believed that at least some harmful bacteria or organisms actually live in atmospheric air and can support themselves in the air. There seemed to be no definite proof on which either school could support its belief and discredit the other theory. Moreover, bacteria in air and their life cycle and habits therein are subjects with which few people in this industry are thoroughly familiar. Partly because of this, the matter of bacterial purification of air is seldom fully considered in connection with actual installations.

During the year some information appeared which bears on the general subject. Doctors Wells and Brown experimentally suspended a strain of influenza virus in air in such a way that droplets of the virus were left in air contained in a closed steel tank of 200 cu. ft. capacity. Samples of this air were drawn out and part was passed directly to an air centrifuge. Another part was passed through a chamber containing a cold quartz mercury vapor lamp by means of which the air could be treated with ultra-violet light and then went to another air centrifuge. Analysis of the air showed that the light exercised a definite action in destroying the virus, for ferrets inoculated with material removed from the air which had not been irradiated with ultra-violet light developed influenza while others inoculated from the light-treated air did not develop influenza. Additional tests tended to show that the virus suspension remained potent in the air for an hour.

These findings, while preliminary, point toward the conclusion that droplets of influenza virus remain active for some time after being suspended in air and that ultra-violet light has a destroying effect on the virus. This may give a clue toward treating air to destroy the potency of some disease-producing substances. As yet no direct effect on practice has been noted.

Pollen in Air

Pollen of the giant and common ragweeds is considered responsible for much of the hay fever and pollen asthma so prevalent in this country. It has been agreed that a method of obtaining relief from these diseases is to put the sufferer into a space where the air does not contain enough of these pollens to cause the symptoms.

The problem has been to demonstrate the correctness of the assumption and also to find suitable practical means of reducing the pollen to a point where it is harmless. The method has been one of trial, and studies of this difficult phase of air filtering have been active for several years.

During 1936 it was stated that Doctors Welker, Rappaport, and Nelson had found means of filtering whereby most hay fever sufferers were relieved entirely or nearly so in a short time after being placed in rooms where practically all the pollen had been filtered from the air. On returning to the open air the symptoms rapidly reappeared. Sufferers from pollen asthma also were relieved under like conditions but had to stay in the filtered air longer in order to obtain relief. Cooling and dehumidifying seemed to provide additional comfort to patients.

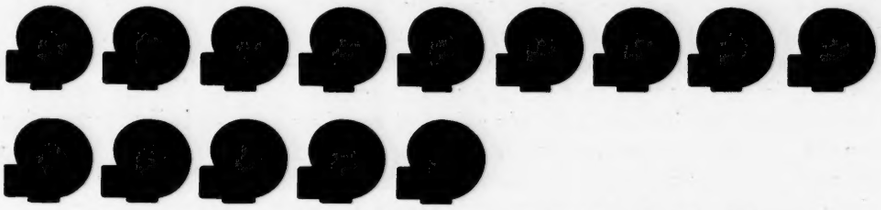
The method of filtering used consisted of blowing outdoor air through a filter of coarse texture paper, replacing the paper as soon as any evidence of clogging appeared. With this material it was stated that 98% or 99% of the pollen was removed from the air. This reduced the concentration to a point where relief was obtained. Ample area of filter material should be provided in order that the air velocity through the filter be low. The equipment used is therefore not particularly expensive and this phase of air cleaning has reached a

EQUIPMENT SALES

YEAR-ROUND AIR CONDITIONING

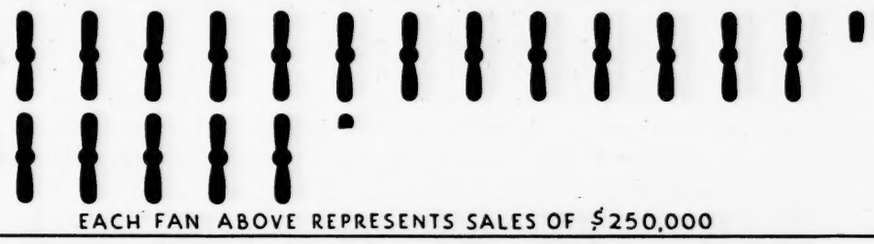
1936 vs. 1935

Blowers for Central Ventilating and Air Conditioning

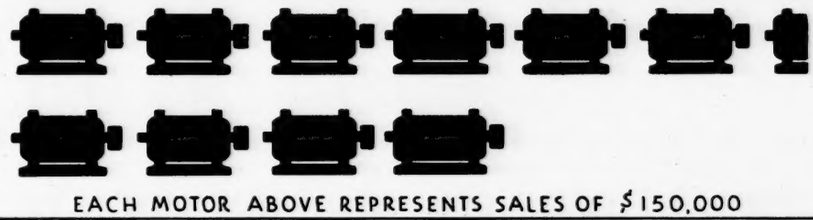


Small Housed and Merchandise Blowers

Propeller Fans

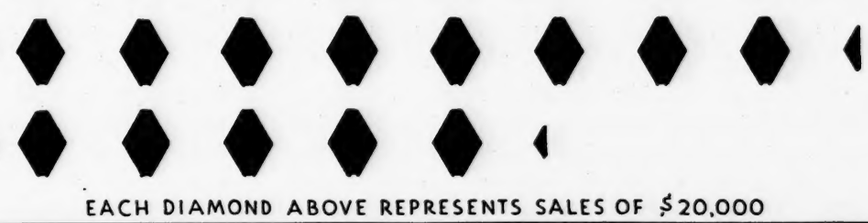


Fan Motors Sold Separately

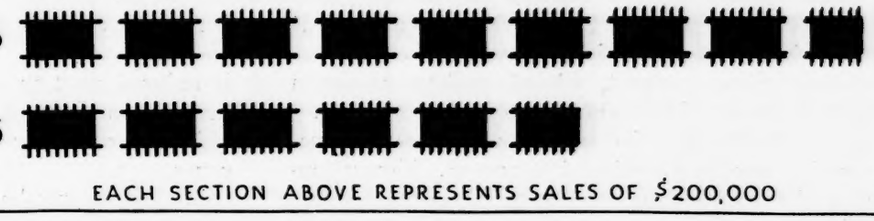


Air Washers

Cast Iron Heating Surface



Non-Ferrous Heating Surface



point where it is reducible to practice. It remains to be demonstrated whether other substances in air can be removed to a point where many of the other allergic diseases can be relieved by filtration.

Sound Prevention and Control

There is a continual urge to run machinery faster and to move air, steam, and water through conduits as rapidly as possible. Sound is frequently a governing consideration in fixing these speeds. Moreover, sound is readily carried by ducts and by pipe lines themselves. Then, too, much of the equipment used for heating, for ventilating, and for cooling generates noise in the course of its operation. All in all, the sound problem is an important one. Also it is a rather baffling one, for sound sources are frequently hard to find and it is frequently even harder to reduce unwanted sounds to a harmless level after the source is located.

Keeping sound levels within bounds is an important part of product design and efforts to minimize sound go on continuously in connection with most equipment. In many cases, however, the product as it comes on the market still generates sound.

It has been proposed that equipment be tested and rated for its sound-producing characteristics and that the sound level ratings be furnished to the user just as the steam output characteristics of a boiler or the speed characteristics of an electric motor are now furnished. This proposal remains as an interesting approach to the sound problem but little concrete progress toward it took place during the year, although a few products now carry sound ratings in catalogs. For unit heaters and coolers, room fans, and similar equipment, sound ratings can be readily applied.

Where such equipment carries sound level ratings it is only necessary to know the type of room into which it is to be placed in order to determine for practical purposes whether or not it will increase the noise level already existing.

Absorption of sound energy carried in air passing through ducts or transmitted along ducts or pipes or reaching ducts or pipes from outside sources is frequently a pressing field problem. Special sound absorbing materials placed either inside or outside the conduit have come into use for this purpose. The pressing application problems have been where to place these materials in order to make them effective, and how much to use. Little progress was reported during the year in connection with these problems. The essentials are well established but solutions of problems in the field are not readily made except by cut and try methods or by measurements not readily made by installers.

In spite of these shortcomings the sound problem has now reached a state where there is enough information, instruments and materials in existence so that many sound problems can be dealt with. Air whistle through grilles and registers has been eliminated in many cases by improved designs and by limiting the air speeds through them. During 1936 improved designs of registers and grilles appeared and indicated the attention which this aspect of the sound problem has received.

Improved methods of mounting and supporting reciprocating machines continued to appear. Typical examples of recent designs are illustrated on other pages of this issue. The supports and mountings are either attached to the equipment at the factory or are designed for field assembly and installation. Light motors and fans now are obtainable which have been equipped with a sound-absorbing base at the factory, while heavy machines such as engines and large motors are soundproofed on the site during installation.

Free Air Currents

Where freely circulating air is the means of carrying and distributing heating or cooling effects to all parts of a room, the air must be kept moving continuously. How to keep it moving rapidly enough to accomplish its intended purpose and still not have the movement accompanied by undue drafts is a difficult technical problem. Practically it is usually worked out by experience which has been gained largely through trial and error. In cases which present unusual conditions suitable circulation of the freely moving air is frequently not obtained at all or is secured only through trial. The other requirement for making use of the free air currents is that they reach all parts of the room where heating or cooling is desired. This means that the air must not only be kept moving but that at the same time it must move in directions where it will accomplish its purpose. The problem of free air currents is thus one of securing proper speed with suitable direction.

The problem is as old as the use of air for heating and cooling. Almost every conceivable artifice has been resorted to in approaching the problem. Location of air outlets and inlets relative to persons and to air temperatures are important as are also such considerations as turbulence of the room air and presence of physical obstructions to air movement. The problem does not lend itself to direct investigation except to a limited extent. Measurements are extremely difficult.

Air direction after leaving the room supply openings is controlled by giving the current a start in the direction desired. Since air is introduced at ceilings, at floor line, and from all heights on the side walls the directional feature varies with the device used. Directional devices or grilles, registers, and distribution outlets continue to be featured. It seems accepted that they are an important feature. Progress during the year in this regard was largely a continuation of a movement which has been under way for several years.

Proper speed of the free air currents also depends largely on the speed with which the air leaves the grilles, registers, or other fixtures. After having left the opening the air is free to drift where it will.

Among the products which appeared during the year for controlling free air currents and thus securing suitable air distribution were new designs of ceiling fixtures which permit combination into a supply and return fixture, a supply and lighting fixture, and similar combinations. Velocities in any direction around the circumference may be adjusted to meet local conditions.

Another device consists of a series of concentric cones so constructed that the velocity of air entering the inlet is reduced as it passes between the cones which thus act as expansion nozzles. Careful design permits great reduction of air speed as the air passes through the cones.

While it cannot be stated that the year saw any defi-

nite changes in practice in controlling free air currents, still there is an unmistakable tendency toward higher duct velocities and high discharge velocities through outlet fixtures. Such practices are in the direction of economy in operation.

The problem of controlling the air as it drifts in the room is still of absorbing interest to many who come in contact with it and is drawing increasingly close study. With the equipment and knowledge now at hand and the continuous improvements appearing, the progress is very real even though it cannot be measured in any terms except the results obtained.

Corrosion of Metals

In essence the corrosion problem is a problem in selecting materials. No metal is corrosion-proof under all conditions. Therefore, there is no one metal which is the answer to all requirements in service. If there were no changes in either the requirements in service, or in the materials available on the market, the problem of making a suitable selection for any case would be greatly simplified. However, the simple fact is that not only are the properties of the older materials being changed from time to time by improvements in production and by advances in metallurgy but new base materials and new alloys appear from time to time. These changes keep the problems of a suitable selection in a state of flux.

It seems to be generally agreed that the best way to determine whether a given material is suitable to a certain requirement is to study the results obtained in actual service. This thought runs through the writings of most experts who have dealt with the problem. Most writers also belittle the value to be attached to the results of accelerated tests made under laboratory conditions. Most also agree that a suitable selection can be made only when the service requirements are fully known, when the problem can be reduced to its elements and when the properties of the material in resisting the corrosion are known. Under such conditions the selection may approach a logical and practical basis.

Collecting information on such a problem is slow work and consequently progress toward a solution is slow. However, there are several points worth noting in connection with events during 1936.

Slowly but surely most manufacturers of corrosion-resisting materials are coming to look on their products as specialties and not as cure-alls for the corrosion problem. During the year efforts of several were directed toward seeking a more intelligent consideration of their product. This is a commercial rather than an engineering development except in so far as they have made technical information and technical help available to users in an attempt to develop more skilled selections. This movement has been under way for some time and consequently does not belong to 1936 exclusively but progress in this direction continued during the year.

Late in the year the American Society of Mechanical Engineers conducted a symposium on corrosion which took the form of a series of papers describing the corrosion-resisting properties of many of the available materials. These papers, appearing in the December, 1936, issue of "Mechanical Engineering," do not deal specifically with the corrosion problems encountered in heating and air conditioning but do contain much data on the physical and chemical properties of the metals.

As a part of the research program of ASHVE, corrosion studies on steam heating systems are under way at Michigan College of Mining and Metallurgy. This study is aimed at finding fundamental data concerning corrosion of metals under conditions encountered in steam heating. Progress reports appeared during the year but results are not conclusive as regards the practical problems of material selection.

Corrosion of metals is also a serious problem in air conditioning and heating where metals are exposed to the air stream passing through ducts and washers. The year produced no notable data or no notable changes in practice in the materials usually selected for these purposes. There is a tendency toward the use of copper, copper alloys, copper-bearing steel, or wrought iron sheets for ducts where the air corrosion problem is encountered. This tendency did not originate during the year but continued throughout.

The problem resulting from corrosion due to hot and cold water passing through pipes is now being increasingly approached through analysis of the particular water being handled. In this application there are service records and local experience to be used as a guide in selecting suitable materials.

Ventilation Standards

After repeated attempts to produce acceptable ventilation standards had failed to produce results, American Standards Association undertook to draw up a standard and called the project Z5. During 1936 nothing of note appeared. The project was still in existence but not active at the year-end.

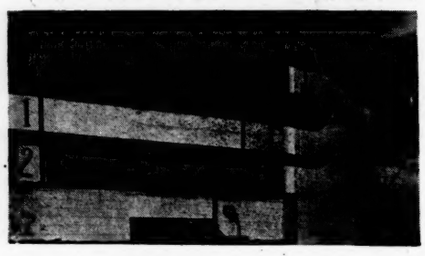
Fastening and Joining

Progress in means of fastening and joining pipes, ducts, and similar parts for our purposes depends on developments in practices made for general use and adapted to this industry. Welding of pipe joints in field and shops enjoyed normal growth. Fabrication by flame cutting and welding likewise proceeded apace during the year. Joining pipes by high temperature solders continued to gain ground especially in lines carrying air conditioning refrigerants. Several manufacturers entered the market with lines of welded air ducts in standard sizes for residential installations. Data on the welding of wrought iron made its appearance.

Society Research in Air Moving and Cleaning

During 1936 the research activities of ASHVE underwent a reorganization. The general plan was to enlarge the scope of the work, and included the raising of a fund to finance increased activity during the next two years. According to a list furnished by the committee on research of the society, a number of the projects conducted by the committee were on subjects having to do with year-round functions. Among them are the following: effect of entering air temperature and velocity on the temperature and distribution of air; study of air cleaning devices; study of conductivities and heat transfer through building materials; what constitutes a draft?; frictional resistance to air flow; corrosion in heating systems.

1936 Progress in Year-Round Equipment



(1) Conventional type air duct. (2) Zonolite air duct. (3) Zonolite air duct with insulation applied.

Zonolite Air Ducts and Insulation

NAME AND NUMBER—Zonolite air ducts and insulation.

PURPOSE—A sound insulation (Zonolite) of which a duct made of wire mesh of a special weave to replace the sheet metal type has been developed. To the wire mesh is applied the insulation, the insulation making a solid covering. Consequently, no sound absorbing liner is necessary, as the insulation meets this requirement. Zonolite is a micaceous, nonferrous, granular material of a bright golden color, with a thermal conductivity of 0.27, and in addition is efficacious as a sound insulator. The Zonolite is applied to the duct in two coats of ½ in. each. Other features include that of being fireproof, resistance of the insulation to part company with the wire mesh, and the ability to carry high air pressures. The complete duct is said to be less expensive than the conventional sheet metal duct with exposed insulation and a sound liner.

MADE BY—*The Zonolite Corp., Detroit, Mich.*

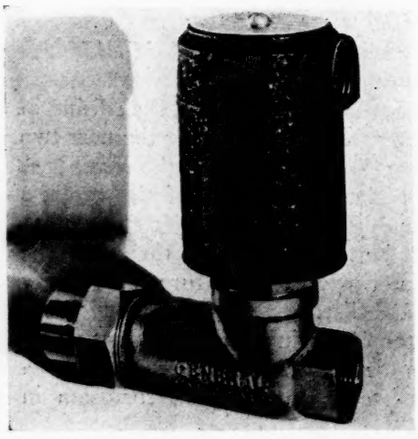
General Controls Magnetic Valve

NAME AND MODEL NUMBER—Type K-10 magnetic valve.

PURPOSE—Control of fluids and gases at high pressures.

FEATURES—Solenoid type with a lever action to exert high seating pressure. Valve closes with flow. Can be used for viscous fluids as well as water, gas, air, refrigerants, steam, and heavy oils. Operation is satisfactory on pressures up to 300 lb. on small port openings. Consumes 14 watts. Is of packless design with internal parts of stainless steel and brass.

MADE BY—*General Controls Co., Los Angeles, Calif.*



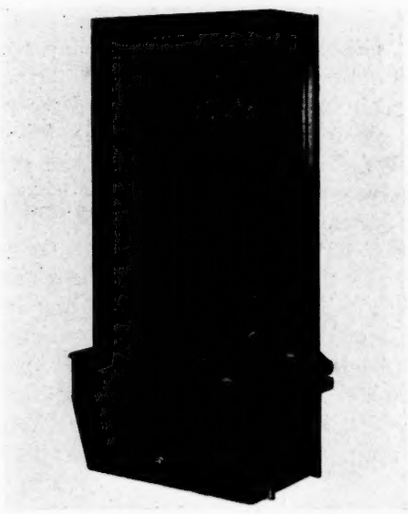
Staynew Filter

NAME AND MODEL NUMBER—Staynew automatic air filter, model A.

FEATURES—Provides four successive stages of filtration, in form of two endless curtains, arranged to rotate in such a manner that the face of the curtain, on the dirty air side, will be thoroughly cleaned before returning to the clean air side. The first stage collects the heavier part of the dust, serves to break up the air flow into small streams, causing it to assume more intimate contacts with the adhesive surface. It then proceeds downward into the oil bath, where the surface tension of the oil film is released, thus allowing the dust particles to settle by gravity to the bottom of the reservoir. In its passage through the oil, media will be immersed for approximately one and a half hours.

Leaving the oil bath, the first stage becomes the second stage, after passing a compressed air line consisting of copper piping with a line of small holes drilled therein, from which air is blown through the medium to remove any unnecessary oil surplus.

The third stage serves to collect any residue of oil that may have a tendency to entrain in the air stream, after passing through the first and second stages, and also serves to entrap the finest dust particles that may remain. This stage proceeds downward into the reservoir, but does not pass through the oil bath, cleaning being accomplished by a second air line,



similar to the first. After passing over this, it becomes the fourth stage, which acts as a preventive to further oil entrainment, and as the final stage in the removal of the fine dust particles.

MADE BY—*Staynew Filter Corp., Rochester, N. Y.*

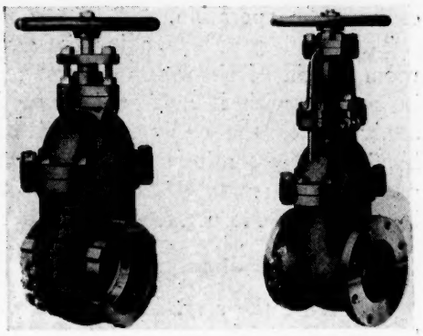
Sarco Steam and Water Mixer

NAME—Sarco steam and water mixer.

PURPOSE—For producing hot water at any desired temperature by mixing steam and water.

FEATURE—Mixer incorporates a three-way valve, a water injector, and a temperature regulator in one compact unit. Nozzle type injectors are used to insure silent operation. Small sizes use single seated valves; large sizes, double seated. Available in capacities ranging from 80 to 1400 g.p.h. 100F rise with steam pressures from 25 to 150 lb.

MADE BY—*Sarco Co., Inc., 183 Madison Ave., New York.*



Kennedy Wedge Gate Valves

NAME—Kennedy wedge gate valves.

PURPOSE—Gate valves for steam working pressures up to 150 lb. and water working pressures up to 200 lb.

FEATURES—The manufacturer states that the metal in these valves is of a particularly dense structure and that it has proved to be more than 50% stronger than ordinary cast iron. Both non-rising stem and outside-screw-and-yoke types have special provisions to facilitate repacking. The stuffing box bolts and nuts are rustproofed to prevent corrosion. Heavy bronze bushings are used wherever the stem passes through a cast iron part to prevent corrosion and scoring.

MADE BY—*The Kennedy Valve Manufacturing Co., Elmira, N. Y.*

Ilg Floated Drive Bracket

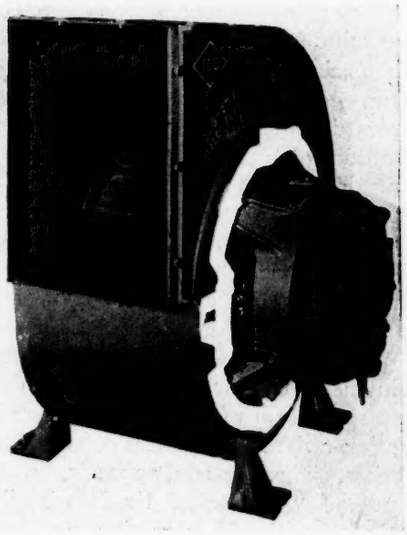
NAME—Ilg floated drive bracket.

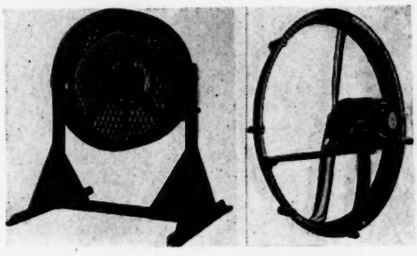
PURPOSE—A sound and vibration dampening device for a direct-connected blower. The new mechanism is intended for use on Ilg direct-connected blowers in locations where special precautions must be taken to obtain unusual quietness of operation.

FEATURES—The standard Ilg motor bracket is mounted on a second floating bracket which is insulated from the blower housing to which it is secured by flexible rubber cushions.

AVAILABLE ON—Can be obtained as original equipment on any Ilg type B or type BC direct-connected Universal blower. Also can be used on blowers already installed.

MADE BY—*Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago.*





Aerovent Airfoil Fan

NAME—Macheta airfoil fan.

PURPOSE—For general ventilation, space, cooling, heat and vapor exhaust, drying, and unit heaters and coolers.

FEATURES—The airfoils are made of aluminum alloy, cast from exact metal patterns, and finished for correct airfoil section and pitch. Advantage has been taken of the considerable latitude afforded in the selection of proper pitch ratios, in the number of blades, from two to six, and with the wide variety of motor horsepower and speed ratings available, to give a flexible line of ratings.

The most outstanding characteristic claimed for these fans is the high efficiency in the region of free delivery, where the majority of propeller exhaust fans operate.

MADE BY—*Aerovent Fan Co., Piqua, Ohio.*

Miller Conditionair

NAME—Miller Conditionair.

FEATURES—A room unit for heating, cooling, cleaning, humidifying, and perfuming or medicating the air, if desired. Unit contains a motor-driven fan which forces the air through the filter and over the extended heating and cooling surfaces. Heating is by a hot water supply line from the water heater. Cooling is by water or direct expansion. Cabinets of furniture steel.

SIZES AND CAPACITIES—550 c.f.m.

MADE BY—*Miller Conditionair, Inc., 1138 South Broadway, Los Angeles, Calif.*

Nu-Way Genii Hot Water Generator

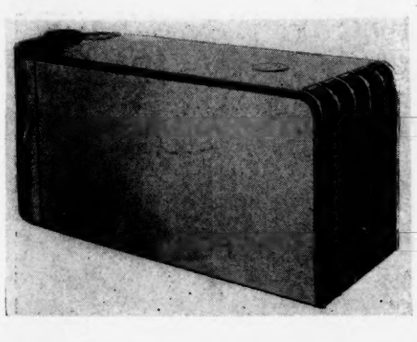
NAME AND MODEL NUMBER—Nu-Way Genii hot water generator, types W and WL.

PURPOSE—For supplying hot water to hotels, apartments, restaurants, and residences.

FEATURES—Model WL has a storage capacity of 91.6 gal. while model W has a capacity of 43 gal. The units will burn either No. 3, No. 2, No. 1 or 27 plus diesel oil. Oil feed, either gravity or suction. Electric ignition on both models.

SIZES AND CAPACITIES—Model WL, 33 sq. ft. heating surface, 170 gal. recovery capacity per hour, 100F rise, 212 gal. per hr., 80F rise. Model W, 18 sq. ft. heating surface, recovery capacity per hour 75 gal. for an 80F rise.

MADE BY—*The Nu-Way Corp., Rock Island, Ill.*



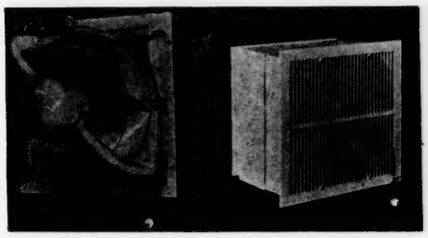
Ilgettes

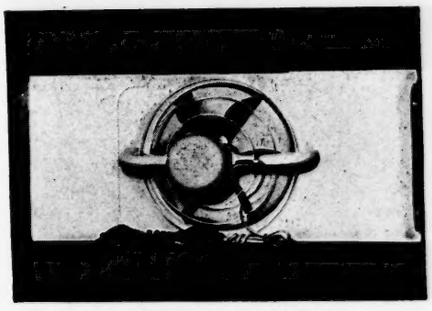
NAME—Ilgette.

Available in four types: the built-in-the-wall; portable window; built-in-the-window, and transom models.

PURPOSE—For kitchen ventilation.

FEATURES—Built-in-the-wall model is suitable for permanent installation. Unit includes fan, cabinet, and grille, the cabinet being fitted with a telescopic sleeve for use with different thickness walls. Started and stopped by nickel silver chain. Portable window type is suitable for use in all ordinary windows. Has adjustable panel and when placed in top of window does not interfere with the curtains, or with raising, lowering, or locking the window. Available in two adjustable panel sizes. Window built-in model is for building into the small panel windows now commonly used.





Upper left, built-in wall Ilgette; upper right, window built-in model; below, portable Ilgette.

Transom model is for use in small apartments and residence kitchens equipped with transoms.

SIZES AND CAPACITIES—1,550 r.p.m. Air capacity 400 c.f.m.

MADE BY—*Ilg Electric Ventilating Co., Chicago, Ill.*

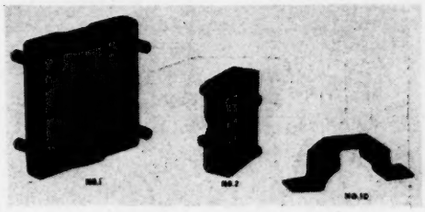
Balsam-Wool Duct Insulation

NAME—Balsam-wool duct insulation.

PURPOSE—For sound and heat insulation of ducts. Consists of a wood fiber mat, chemically treated to be fire, moisture, vermin, and rot resistant. Mat is covered on each surface with a Kraft liner. One long edge is sealed, the other is sealed and flanged. It is applied to the exterior of the duct and fastened by an adhesive. Advantages claimed by the manufacturer include the following: Duct is not punctured by screws or other fastening devices; wide strips of insulation eliminate many joints; all joints can be sealed; application cost said to be low as result of wide strips and because the material can be wrapped around the duct.

SIZES AND CAPACITIES—Available in either ½ or 1 in. thicknesses, and in widths of 21 and 40 in. Special widths up to 96 in. obtainable. Properties of the ½ and 1 in. insulation, respectively, are: weight in pound per square foot, 0.24 and 0.37; conductance in B.t.u. per square foot per hour per degree temperature difference, 0.394 and 0.218.

MADE BY—*Wood Conversion Co., St. Paul, Minn.*



Goodrich Vibro-Insulators

NAME—Goodrich Vibro-Insulators.

PURPOSE—Vibration damping rubber-to-metal mountings designed for bases of machines and other mechanisms.

FEATURES—Mountings are of the shear type, consisting of rubber bonded to two metal plates, one of which is fastened to the vibrating member and the other to the support.

SIZES AND CAPACITIES—Type 1, maximum load of 800 lb. and a minimum frequency of 800 vibrations per minute. Type 2, maximum load of 200 lb., minimum frequency of 1,200 vibrations per minute. Type 10, for loads from 50 to 3,000 lb., minimum frequency of 1.000 vibrations per minute.

MADE BY—*The B. F. Goodrich Co., Akron, Ohio.*

Hobart Thinweld Welding Rod

NAME—Hobart Thinweld welding rod.

PURPOSE—A specially coated electrode for arc welding light gage sheet metal.

SIZES AND CAPACITIES—1/16 in., 3/32 in., and ⅛ in.

MADE BY—*Hobart Brothers Co., Hobart Square, Troy, Ohio.*

Korfund Seismo-Damper

NAME AND MODEL NUMBER—Korfund Type-T Seismo Damper.

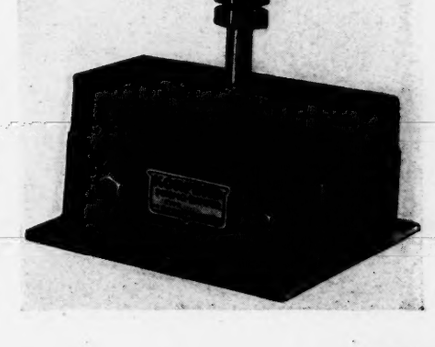
PURPOSE—Vibration isolation support for medium and light machinery.

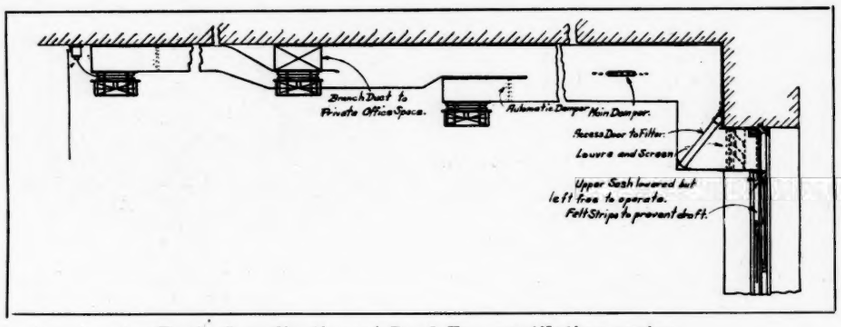
FEATURES—The machine to be isolated is directly supported by a T-iron separated from a base of two angle irons by natural cork or other isolating material. The angle irons are firmly connected by bolts passing through the isolating materials and T-iron, but not touching it.

Before installation these bolts are adjusted to produce a precompression of the isolating material to suit the machine load. Further adjustment can be made after installation. Where the machine frame is light or must be supported at several points the T-iron can be extended to form a continuous support between two or more Seismo-Dampers. This eliminates undue bending stresses in the machine frame.

SIZES AND CAPACITIES—From 100 to 2,500 lb.

MADE BY—*The Korfund Co., Inc., 48-15 Thirty-Second Place, Long Island City, N. Y.*




Branch Duct to Private Office Space.
Automatic Damper
Main Damper.
Access Door to Filter.
Louvre and Screen
Upper Sash lowered but left free to operate.
Felt Strips to prevent draft.

Typical application of Dual Fan ventilating system

Troxell Dual Fan Ventilating System

NAME—Dual fan ventilating system.

FEATURES—Outside air is drawn in, filtered, and delivered in ducts to disseminating points. At these points, the dual fans, powered by fractional horsepower motors in each unit, pull the air through the duct, release fresh air at the unit location, mix it with room air. The fresh air is diffused horizontally in all directions, near the ceiling, and sinks downward in a draftless flow. Motors are concealed in the duct and plug into lighting circuit. Unit is readily accessible, can be taken down without tools for inspection and oiling. Automatic dampers keep each unit working while other units on the same duct may be shut off. A main damper can control the fresh air intake or stop it altogether.

SIZES AND CAPACITIES—Fans are available in six different models with capacities ranging from 100 to 425 c.f.m. each.

MADE BY—*E. R. Troxell, Jr., Bronxville, N. Y.*

P & H-Hansen Smootharc Welders

NAME—P & H-Hansen Smootharc welders.

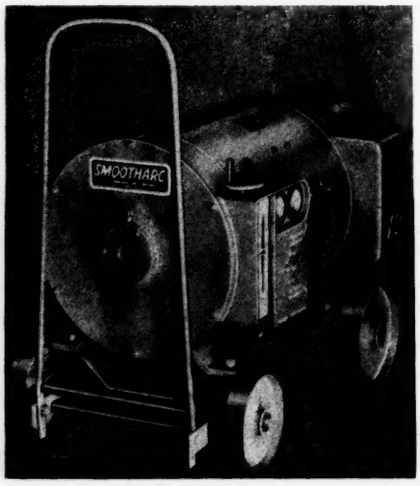
PURPOSE—For electric welding.

FEATURES—A single automatic current control is used to control the operation of this welder. Patented stabilizing coils imbedded in the main pole flanges of the generator are said to result in a high degree of arc stability. Other features include all controls centrally grouped, one-way positive ventilation, close coupled contact designed, all welded construction, drip-proof enclosure.

SIZES—Available in a wide range of sizes and mountings from 75-600 amperes.

LITERATURE AVAILABLE—Bulletin No. W-8.

MADE BY—*Harnischfeger Corp., Milwaukee, Wis.*

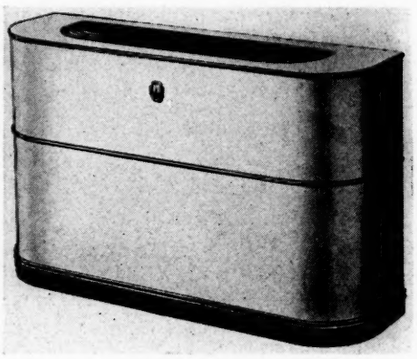


Ortho-Clime Air Conditioners

NAME—Additions to the Ortho-Clime air conditioning units.

FEATURES—Model 612 is designed for both cooling and heating. Has a 1-ton cooling capacity. Two ceiling suspended units, models 715 and 736, are available in 1½-ton and 4-ton cooling capacities. A fourth one is a self-contained room cooler of about ¾-ton cooling capacity.

MADE BY—*Fairbanks, Morse & Co., Chicago.*



Enclosed Motor for Industrial Service

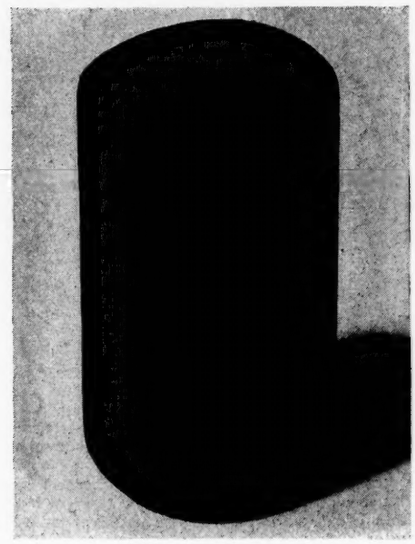
NAME AND MODEL NUMBER—Type SK. fan cooled totally enclosed DC motor.

PURPOSE — Designed for industrial service, such as automobile factories, foundries, cement plants, coal tipples, rock products plants, machine shops, and steel mills.

FEATURES—Built so that all foreign matter is excluded from the interior of the motor. Interior of this type of motor is also protected against the entrance of splashing water such as occurs during the hosing of floors or walls.

SIZES AND CAPACITIES—5 to 75 hp., 115, 230 and 550 volts.

MADE BY—*Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*



Sponge Rubber Insulation

NAME—Sponge rubber insulation.

PURPOSE—Heat insulation, especially for cold lines in air conditioning and refrigeration.

FEATURES—In addition to being porous, sponge rubber is flexible and can be molded into nearly every conceivable shape. It is available in tubing which can be used to cover pipe lines when straight, curved or coiled by slipping it over the pipe, thus making possible quick assembling of insulation for the line. Available also in flat slabs and in molded fittings to conform to many peculiarly shaped valves and joints.

SIZES AND CAPACITIES—Available in several densities. The coefficient in B.t.u. per hour per square foot per degree difference per inch of thickness is 0.64 for 0.27 oz. per cu. in. density; 0.69 for 0.28 density, and 0.72 for 0.285 density. Tubing available with inside diameter ranging from ¼ in. to ¾ in., and with outside diameters ranging from ¾ in. to 1¼ in., and in lengths from 22 in. to 46 in. Flat slabs are available in various colors including black, yellow, and red, and in a number of different sized sheets and in thicknesses ranging from approximately ⅛ in. to 1 in.

MADE BY—*Miller Rubber Co., Inc., 1247 S. High St., Akron, Ohio.*

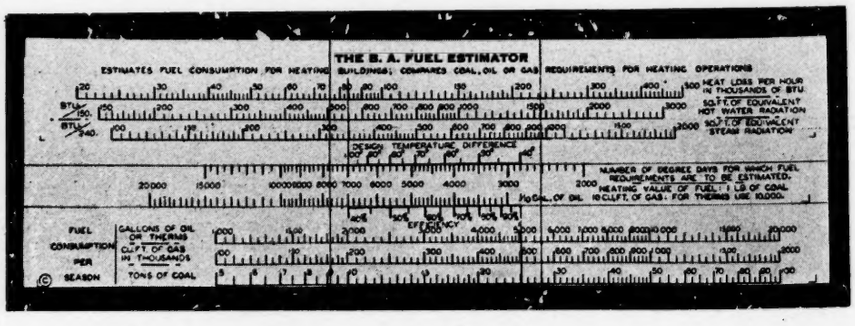
B. A. Fuel Estimator

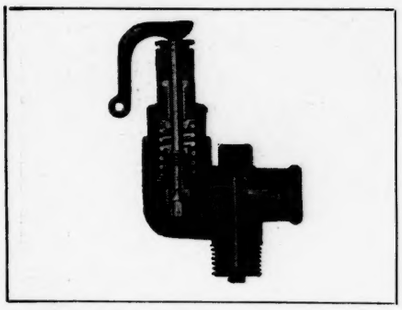
NAME—B. A. Fuel Estimator.

PURPOSE—A slide rule combination for estimating fuel consumption for the heating of buildings regardless of fuel or location.

FEATURES — Takes into account variables such as heat loss, amount of standing radiator, number of degree-days, and heating value of various fuels.

MADE BY—*Calculator Specialties Co., Chicago.*


THE B. A. FUEL ESTIMATOR
ESTIMATES FUEL CONSUMPTION FOR HEATING BUILDINGS; COMPARES COAL, OIL OR GAS REQUIREMENTS FOR HEATING OPERATIONS
HEAT LOSS PER HOUR IN THOUSANDS OF BTU
SQ. FT. OF EQUIVALENT HOT WATER RADIATION
SQ. FT. OF EQUIVALENT STEAM RADIATION
DESIGN TEMPERATURE DIFFERENCE
NUMBER OF DEGREE DAYS FOR WHICH FUEL REQUIREMENTS ARE TO BE ESTIMATED
HEATING VALUE OF FUEL: 1 LB. OF COAL
1 GAL. OF OIL
10 CU. FT. OF GAS: FOR THERMS USE 10,000.
EFFICIENCY
FUEL CONSUMPTION PER SEASON
GALLONS OF OIL OR THERMS
CU. FT. OF GAS IN THOUSANDS
TONS OF COAL



Watts Pres-Tem-Vac Valve

NAME AND MODEL NUMBER—Watts Pres-Tem-Vac valve, No. 20.

PURPOSE—A combined pressure, temperature, and vacuum relief valve.

FEATURES—The pressure and vacuum relief features are incorporated in a single unit located at the top of the valve body. The whole unit can be removed in a few minutes for cleaning. The pressure relief feature is adjustable. Standard setting is 125 lb. with an adjustment range of 50 to 150 lb. The vacuum valve opens on the slightest vacuum. The temperature element is completely separated from the pressure vacuum relief of the valve and the fuse plug stem can be removed from the valve without disturbing the pressure adjustment and without removing the valve from the line. Valve is built of bronze and other non-corrosive metals.

MADE BY—*Watts Regulator Co., Lawrence, Mass.*

De La Vergne Air Conditioners

NAME AND MODEL NUMBER—Models AA and AW unit air conditioners.

PURPOSE—AA models for summer air conditioning only unless equipped with reversed refrigeration or steam coils. Models AW for summer air conditioning only unless equipped with steam coils.

FEATURES—AA models require only a connection to electric lines and a duct to outside air. Reversed refrigeration equipment for heating during the winter is optional on all AA models. Nos. 1 and 1½ units are floor type while No. 4 unit is the ceiling type. AW units require a connection to electric line, water supply and drain. If these units are to be used for heating a steam coil is provided. Freon is used in all units. Compressor unit is sealed.

SIZES AND CAPACITIES—No. 1 AA unit, 1 ton refrigerating capacity; No. 1½ AA unit, 1¼ tons; No. 4 AA unit, 4 tons; No. 1 AW unit, 1 ton; No. 1½ AW unit, 1½ tons.

MADE BY—*De La Vergne Engine Co., Philadelphia, Pa.*

Worthington Pump

NAME AND MODEL NUMBER—Monobloc type DH centrifugal pump.

PURPOSE—Hot well service and handling liquids near their vapor pressures. Intended for power plants, heating systems, and air conditioning and refrigeration plants and for handling volatile liquids against medium heads.

SIZES AND CAPACITIES—Compact. Overall floor space required by the largest model is 24 x 16 in. Capacities from 10 g.p.m. against heads of 50 to 110 ft. with 12 in. submergence; 175 g.p.m. against heads of 50 to 70 ft., with 60 in. submergence.

MADE BY—*Worthington Pump and Machinery Corp., Harrison, N. J.*

Emerson Seabreeze Exhaust Fan

NAME—Seabreeze ventilating fans.

PURPOSE—Air exhaust.

FEATURES—Induction type motor, self-aligning wool-packed bronze bearings with felt-packed oil reservoirs. Adjustable panel for windows or transoms said to be easy to install and not to interfere with operation of window. Wall box, adjustable to wall thickness, may be installed in homes under construction, or already completed, and has an automatic door-jamb starting and stopping switch. A handle for convenient operation of the door furnished. Panel and wall box are finished in washable grey finish.

MADE BY—*Emerson Electric Mfg. Co., St. Louis, Mo.*

Duct Insulation Corkboard

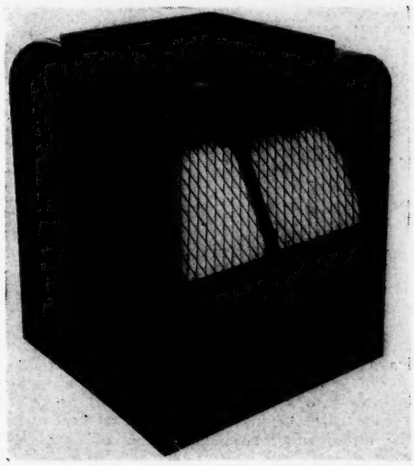
NAME AND MODEL NUMBER — Armstrong's DI corkboard.

PURPOSE—A corkboard for installation on ducts to prevent condensation of moisture.

FEATURES — Corkboard is not affected by moisture and has a thin mastic coating on one side which, it is claimed, strengthens the material and increases its flexibility and seals it against moisture penetration. It is said that reinforcement with wires or bands is not necessary in most cases.

SIZES AND CAPACITIES — Available in ½-in. thickness in 12 in. x 36 in. sheets.

MADE BY—*Armstrong Cork Products Co., Lancaster, Pa.*



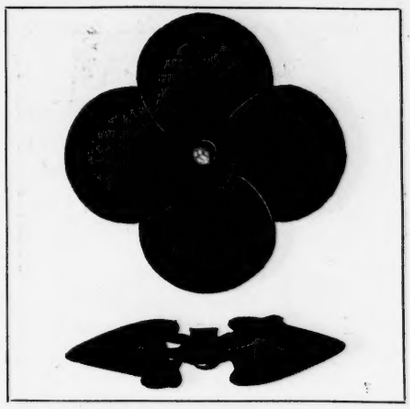
Schwitzer-Cummins Blower Unit

NAME—Hy-Duty blower-filter unit.

PURPOSE—For use with a warm air furnace for supplying forced and filtered air.

FEATURES—The blower is a 14-in. Hy-Duty type mounted on self-oiling and self-aligning bearings. Unit is made of heavy gage rust-resisting steel; has ¼-hp. drive motor, and is equipped with an overload protection. Unit is guaranteed for two years.

MADE BY—*Schwitzer-Cummins Co., Massachusetts Ave. and Fan St., Indianapolis, Ind.*



Torrington Fan Blade

NAME—Aristocrat fan blade.

PURPOSE—A new type propeller fan blade for quiet operation.

SIZES—10, 12, and 16 in. in diameter. Other sizes will be announced in the future.

MADE BY—*The Torrington Manufacturing Co., Inc., Torrington, Conn.*

Speedway Flea-Power Motors

NAME—Speedway worm drive back-geared flea-power motor.

FEATURES—Available in a.c., d.c. and universal models. Can be assembled with drive shaft to right, left, up or down. Has wide range of selected speeds on final shaft.

SIZES AND CAPACITIES—Is 2½ x 3 x 4 in. including reduction gears. Inputs from 4 to 15 watts.

MADE BY — *Speedway Manufacturing Co., 1834 South 52nd Ave., Cicero, Ill.*

Kurtz Psychrometric Slide Rule

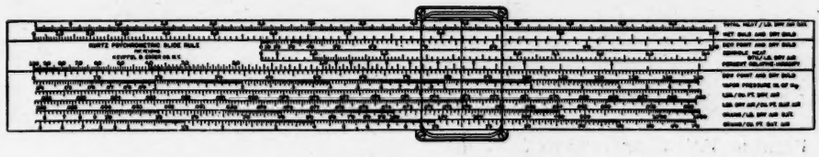
NAME—Kurtz psychrometric slide rule.

PURPOSE—Intended to replace psychrometric charts and tables.

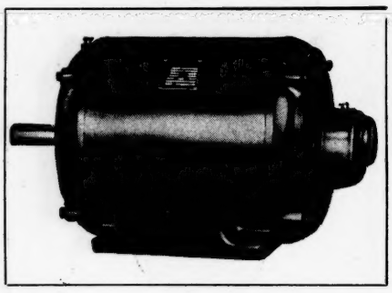
FEATURES—Rule so arranged that if any two of four fundamental psychrometric factors (dry bulb, wet bulb, or dewpoint temperatures and relative humidity) are known, other two may easily be determined by one or two settings of slide. In addition, values can be read directly from dry bulb temperature for pounds of dry air per cubic foot of dry air and sensible heat in B.t.u. per pound of dry air; from the wet bulb temperature can be found total heat in B.t.u. per pound of dry air in a saturated mixture; from the dewpoint temperature can be read vapor pressure in inches of mercury, pounds of dry air per cubic foot of saturated air, grains of moisture per pound of dry air saturated with moisture, and grains of moisture per cubic foot of saturated air. Thus, complete information on any possible mixture of air and water vapor within the temperature range of the slide rule may be obtained. An additional feature is the group of tables and fundamental formulas, pertinent to air conditioning in general, printed on the back of the rule as a handy reference for the user.

SIZE—Rule is 11 x 1⅝ in. Finished in white enamel, black figures. Based on barometric pressure of 29.92 in. of mercury.

MADE BY—*The Keuffel & Esser Co., Hoboken, N. J.*



Kurtz psychrometric slide rule.



Emerson Type SR Motor

NAME AND MODEL NUMBER—Type SR single phase motor.

PURPOSE—To meet demand for a single phase motor with a smooth torque-speed curve.

FEATURES—Efficient starting features of repulsion motors and the approximately constant-speed load operation of the induction motor. Suitable for such applications as air compressors, commercial refrigerators, pumps, and other devices which have a heavy starting load or in which starting is prolonged on account of excessive friction. Has armature with both squirrel cage winding and repulsion winding. Both windings operate as such at all times.

SIZES AND CAPACITIES—Available in 1, 1½, 2, and 3-hp. models. 1725 r.p.m.

MADE BY—*The Emerson Electric Mfg. Co., Inc., St. Louis, Mo.*

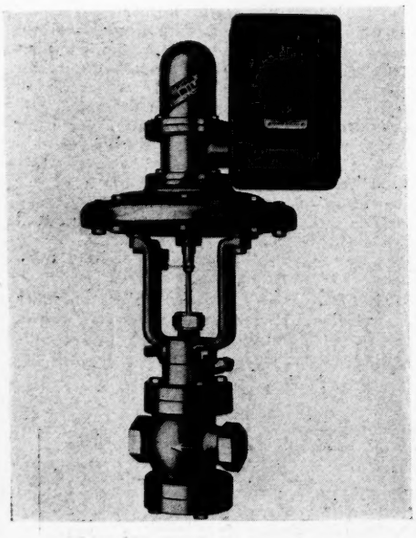
Foxboro Valvactor

NAME—Vernier Valvactor.

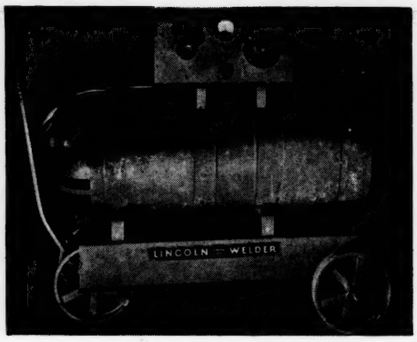
PURPOSE—To enable small gradual adjustments of the control valve position on throttling type air operated control instruments.

FEATURES—Air from control instrument need change as little as ½ in. of water to cause a corrective positioning of valve and force stem to take a position within 1/1000 in. of previous setting, it is claimed. Mounted in cast aluminum case. Weatherproofed. Can be attached directly to the spring housing of all sizes of Stabilflo valves. For needle valves it is mounted on side of motor supports.

MADE BY—*The Foxboro Co., Foxboro, Mass.*



Vernier Valvactor mounted on a Stabilflo valve.



Lincoln Shield Arc Welder

NAME AND MODEL NUMBER—Shield arc SAE welder.

PURPOSE—Welding.

FEATURES — The predominating feature of this arc welder is a new method of arc control which makes possible the adjustment of both arc heat and arc penetration in a continuous sequence of fine increments. It is claimed that this continuous dual control assures uniformity of performance at every control setting and adds to the successful operation of arc welding. This new welder will supersede the present type of shield arc and is said to retain all of the important design points of the older device.

SIZES AND CAPACITIES—A.c. motor-driven—200, 300, 400, and 600 amp.; d.c. motor-driven—300, 400, and 600 amp.; generator for belt or couple service—200, 300, 400, and 600 amp.; engine-driven—200, 300, and 400 amp.

MADE BY—*The Lincoln Electric Co., Cleveland. Ohio.*

American Airmat Filter

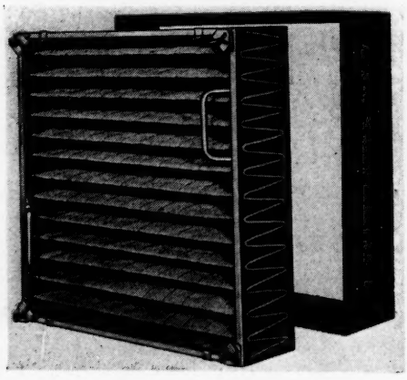
NAME AND MODEL NUMBER — Airmat PL-24 filter.

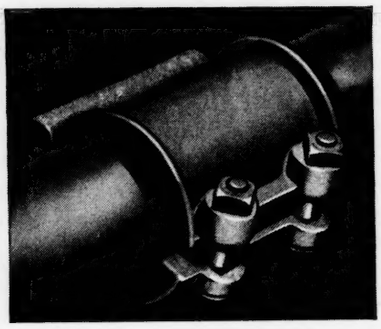
PURPOSE—A dry filter of a new design for air conditioning service.

FEATURES—Standard unit construction with an interchangeable filter element and frame. The filter element is composed of two matched serrated sections which support the Airmat in deep pleats to provide maximum filtering area and to seal the saw-tooth edges against air leakage. The filtering material, which is furnished in rolls, is applied to the filter element by means of a simple loader. Either 6-ply or 10-ply Airmat may be used, depending upon the air cleaning requirements of the application.

SIZES AND CAPACITIES—24 in. square by 8 5/16 in. deep, rated at 1,000 c.f.m.

MADE BY—*American Air Filter Co., Inc., Louisville, Ky.*





Skinner Pipe Clamps

NAME—Skinner pipe clamp.

PURPOSE—A pipe clamp for stopping leaks in pipes.

FEATURES—All clamps except those for use on high pressure lines, can be installed while lines are in service. Clamps are hinged on one side for ease in installation. They are enamelled and equipped with cadmium-plated steel bolts and rubber gaskets.

SIZES—Available for stopping leaks in all types of pipe lines, either high or low pressure.

MADE BY—*M. B. Skinner Co., 3774 W. Sample St., South Bend, Ind.*

General Pressure Regulator and Solenoid Valve

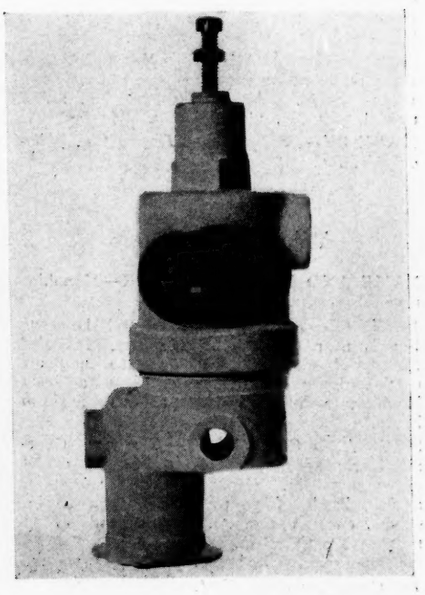
NAME AND MODEL NUMBER—Water pressure regulator and solenoid valve, model D.E.

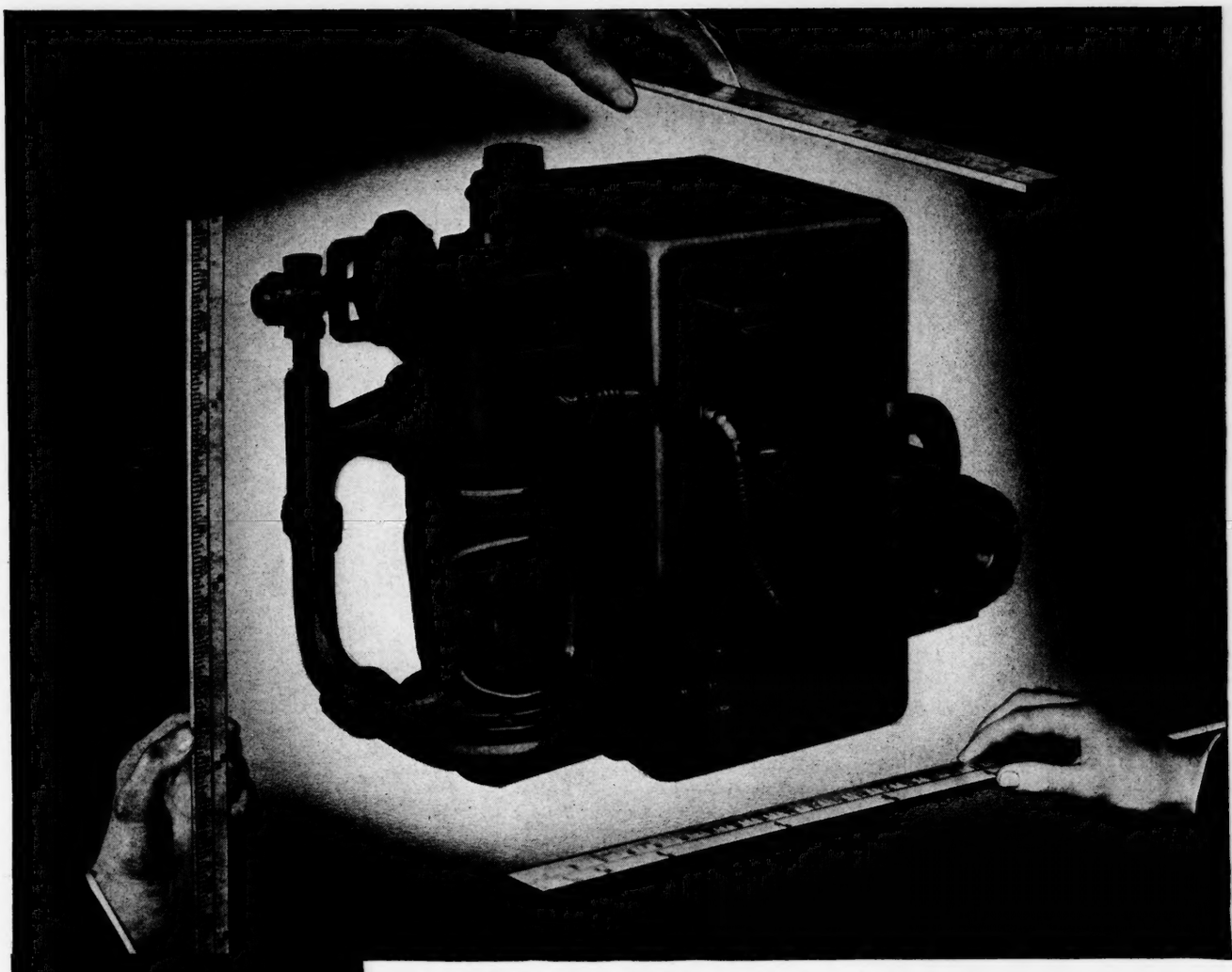
PURPOSE—Valve is designed for application where it is necessary to control electrically the flow of water or air and also necessary to control the pressure at which the fluid is delivered from the valve.

FEATURES—The solenoid coil is manufactured by a patented process which is said to seal the windings against the entrance of moisture. Valve body is of cast bronze and the diaphragm is made of canvas and rubber. Non-corrosive materials are used for the valve and spring. A large area, fine mesh strainer of monel metal is incorporated in the valve. The standard adjusting spring allows delivery pressure to be maintained at any point from 5 to 50 lb. with a maximum pressure of 100 lb.

SIZES—¼ and ⅜ in. I.P.S.

MADE BY—*General Sales & Products Corp., 75 Mohawk St., Cohoes, N. Y.*





MORE COMPACT...LOW IN PRICE

...but full capacity!

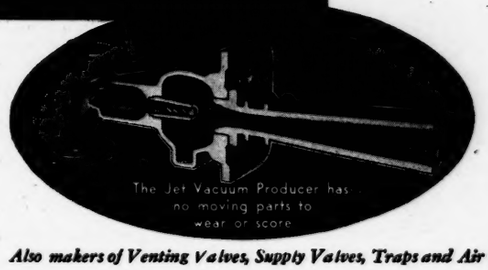
A SENSATIONAL IMPROVEMENT IN VACUUM PUMP DESIGN

Here's a triumph of mind over matter—a vacuum pump of large capacity, full efficiency, but reduced by skillful engineering to amazingly small dimensions. It's the answer to the modern cry for elimination of excess bulk and weight. And the answer to demands for economy, *because manufacturing costs have been reduced in like proportion!*

So today you have available the Hoffman-Economy Vertical Vacuum Pump—a unit of outstanding quality.

This improved design pump is made in four sizes, from 2500 to 15000 sq. ft. capacity. It is completely furnished with electrical and control equipment of heavy-duty construction. It features the Jet Vacuum Producer, with ability to handle extremely hot water . . . exceptional peak water capacity . . . automatic control and cast iron receiver. Noiseless, efficient and long-serving.

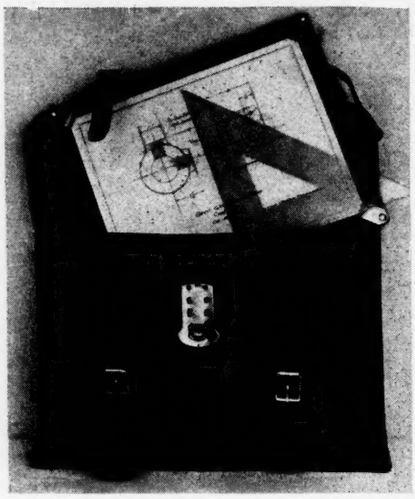
Write today for new special VVP-137 Bulletin giving full description, prices and capacities. Hoffman Specialty Co., Inc., Dept. HV-1, Waterbury, Conn.



VERTICAL VACUUM

HOFFMAN ECONOMY PUMPS

Also makers of Venting Valves, Supply Valves, Traps and Air Conditioners— sold everywhere by leading wholesalers of Heating and Plumbing equipment.



Pretty Neat Drawing Board

NAME—"Pretty Neat" drawing board.

PURPOSE—A light weight and attractive appearing drawing board for use at the desk or elsewhere, but especially applicable for carrying in a brief case.

FEATURES—Made of pressed wood. Paper is held by strong clamps in the corners and can be quickly inserted or removed and needs no thumb tacks. Clamps are lifted by pressure of finger on small buttons on back of board. Edges are all square so that triangle can be used along any edge, thus eliminating necessity for T-square. Made in several sizes and weighs less than one pound. Designed for sketches and charts and other drawings, and is especially useful for sales engineers and field engineers where a larger board is too cumbersome to carry around.

SIZES AND CAPACITIES—Available in sizes to take the following size paper: 8½ x 11, 9 x 12, and 10 x 15 in. Other sizes made to order. Price $1.50 f.o.b. Riverside, Calif., for 8½ x 11 in. size. Prices for the larger sized boards are $1.75 and $2.25.

MADE BY—*H. E. Twomley, 7154 Magnolia Ave., Riverside, Calif.*

Brett-Gibbons Damper

NAME — Brett - Gibbons automatic volume damper.

PURPOSE—Supplemental dampers which are to be attached to the mixing damper blades to eliminate drafts, unbalanced air distribution, air stratification, and variable air temperatures in heating and ventilating systems.

FEATURES — The supplemental dampers maintain a balanced condition of air flow to the various spaces and air ducts due to control of air volume and velocity to each air duct during periods of preheating damper full connections to the preheating chambers. The volume of air to each space of occupancy is maintained constant with either connection of reheating and preheating chambers to the air supply duct systems. A perfect balance of the air volume is said to be maintained for the comfort of the occupied spaces during the temperature regulating periods. The application of the supplemental dampers provides an improved mixing damper performance by stabilizing the damper blade openings, thus preventing a variable and extreme blade travel throughout the operating periods of the heating ventilating system. Stabilization of damper travel is said to provide a reduction of the fuel expenditure by avoiding periodic heating and cooling for temperature regulation with connections of the duct system to reheating and preheating chambers.

MADE BY—*Thomas J. Brett and Edward A. Gibbons, 7603 East End Ave., Chicago, Ill.*

Van System Air Conditioner

NAME—Van System air conditioning unit.

FEATURES—Unit depends entirely on washed air. Air is passed twice through a sheet of water produced through a whirling element. Gravity and momentum separates free water from the air. Humidistat controls amount of moisture added to air. Unit is designed to be connected to a warm air furnace type unit. Cools and dehumidifies in summer through evaporation and washing.

SIZES AND CAPACITIES—Air capacity 1,600 c.f.m. Humidifying capacity is 2 gal. per hr., ½-hp. motor. Dimensions of unit, 29x38x32 in. Finished in black crystal lacquer, and other colors.

MADE BY—*Railway Utility Co., Chicago.*

Armco Paintgrip Sheets

NAME AND MODEL NUMBER — Armco Galvanized Paintgrip sheets.

PURPOSE—A new type of galvanized sheet metal which can be painted without special treatment of the surface by the user.

FEATURES—Manufacturers claim that the new paint grip sheets have all the value of full coated galvanized sheets with the added protection of a special insulating coating that keeps the paint from direct contact with the zinc surface. It is said that the forming qualities are the same as untreated galvanized sheets with corresponding weights of coating. Paintgrip treatment is available in any of the grades of galvanized sheets and is supplied in two surface finishes, regular and extra-smooth.

MADE BY—*The American Rolling Mill Co., Middletown, Ohio.*

Eagle Plastic Insulation

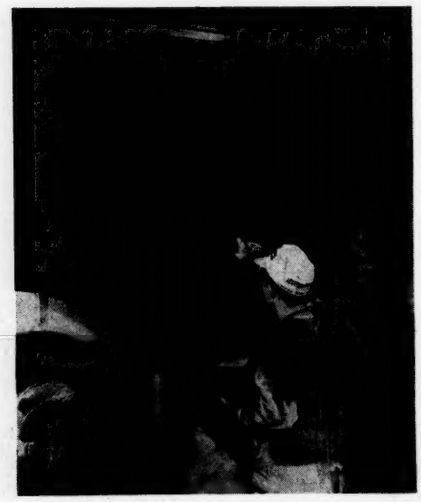
NAME AND MODEL NUMBER—The Eagle Super 66 plastic insulation.

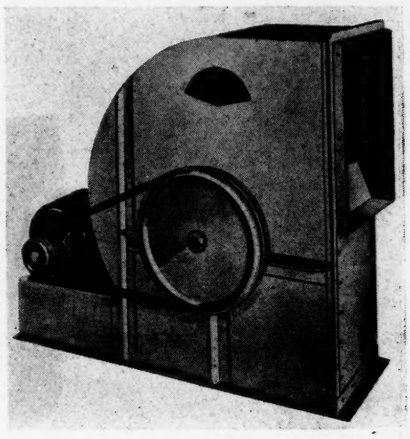
PURPOSE—A plastic insulation for use on practically any form of heat producing or transferring equipment with surface temperatures as high as 1,800F.

FEATURES — Insulation can be applied on either hot or cold surfaces and the manufacturer states that its strong adhesiveness makes it especially useful for insulated irregular pieces. It is installed by mixing the material with water, spotting it on the surface, and then trowelling it to a smooth finish. It can be removed, remixed, and used over again when subjected to temperatures up to 1,200F.

COVERAGE—60 sq. ft., 1 in. thick per 100 lb.

MADE BY — *The Eagle-Picher Sales Co., Temple Bar Bldg., Cincinnati, Ohio.*





Autovent V-Belt Blower

NAME AND MODEL NUMBER—Autovent V-belt drive unit blower.

PURPOSE—To meet conditions where for various reasons a belt-driven blower is considered more desirable than a direct connected blower.

FEATURES—Has a uniblade type H blower. Is equipped with suitable V-belt drive operated by a standard frame motor. Motor is mounted on a steel pedestal base, built integral with blower housing. Manufacturer claims that standard motors operated at 1,750 r.p.m. are more efficient than slow speed motors furnished with direct connected blowers in order to conform to the blower speeds. V-belt drive makes it possible to interchange motors due to changing current characteristics or break-down.

SIZE AND CAPACITIES—Five wheel diameters from 12½ to 25 in. Complete line covers range of capacities from 1,245 c.f.m. to 8,350 c.f.m. at ¼ in. static pressure or from 830 c.f.m. to 6,345 c.f.m. at 1 in. static pressure.

MADE BY — *Autovent Fan & Blower Co., 1805 N. Kostner Ave., Chicago, Ill.*

Whitney Clip Punch

NAME—Whitney Clip punch.

PURPOSE — A tool for joining sheet metal in the construction of ducts.

METHOD OF OPERATION — The tool punches out a triangular "ear" in the seam, this ear then being folded back by hand to form a secure fastening with a three-way lock.

FEATURES—The punch has a capacity of two thicknesses of 16-gage metal and is so constructed that it can be used in narrow places. The jaws and handles are of drop forged steel with hardened pins.

MADE BY—*The Whitney Metal Tool Co., Rockford, Ill.*

Gar Wood Air-Duct System

NAME—Gar Wood air-duct system.

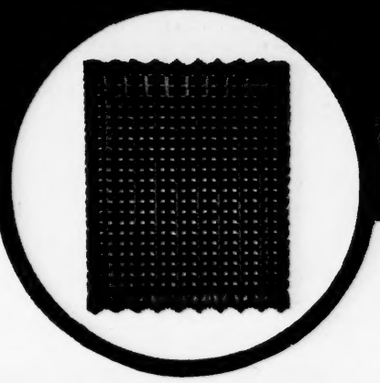
PURPOSE—A predesigned air-duct system for automatic heating and air conditioning.

FEATURES—The duct system is composed of predesigned stock parts. Runouts from the trunk lines to the grilles are limited to four sizes, all a single depth to fit a standard of 2 in. x 4 in. partitions. Sizes are maintained for the entire run without transformation. It is said that because of a newly developed method of trunk design, the number of stock parts required has been reduced to one standard sized panel for each depth and if a single depth trunk is used there is only one part employed.

MADE BY—*Gar Wood Industries, Inc., Detroit, Mich.*

VENTO

CAST IRON HEATERS



TEMPERING COILS

For Heating, Ventilating and Air Conditioning

VENTO HEATERS are ideal for use in air washing and humidification . . . moisture cannot injure them nor can Time . . . *they outlive the building in which they are installed.* Streamlined studs cover the surface, combining maximum contact surface with low air resistance. Where durability and satisfactory control are desired, engineers have specified Vento for over 30 years.

AMERICAN RADIATOR COMPANY

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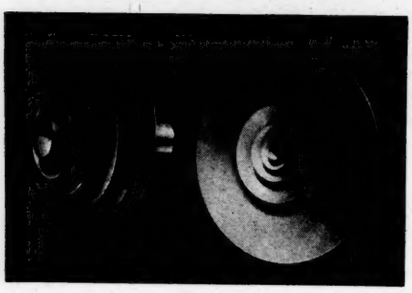
BETTER HOUSING PROGRAM



Type A and Type C Anemostats

Anemostat Air Inlet

NAME AND MODEL NUMBER — Anemostats, types A, B & C.

PURPOSE—For supplying high velocity air to a room without objectionable noises or drafts.

FEATURES—Anemostat is made up of a number of truncated cones which are used to break up and expand the high velocity air stream so that it enters the room without causing drafts. The manufacturer claims that the device is so constructed that the velocity of the air current passing through the inlet neck can be reduced down to one-twentieth of the initial velocity. By a re-arrangement of the cones the Anemostat can be made to provide any outlet speed or distribution. The velocity of the air as it emerges from the unit can be made practically uniform over the entire surface or may be given any desired value in any direction. The Anemostat also draws a small proportion of the room air in through the center cone and mixes it with the conditioned air before it is distributed to the outer cones. The resistance of the Anemostat is said to be about 30% higher than 90° bend in a duct of the same diameter as the Anemostat neck.

SIZES AND CAPACITIES—Type A is used for air velocity up to 5,000 f.p.m.; type B for velocity up to 4,000 f.p.m. and type C for velocity up to 2,500 f.p.m. Capacities range from 34 to 3,200 c.f.m.

MADE BY—*Anemostat Corporation of America, 551 Fifth Ave., New York.*

Worthington Centrifugal Pump

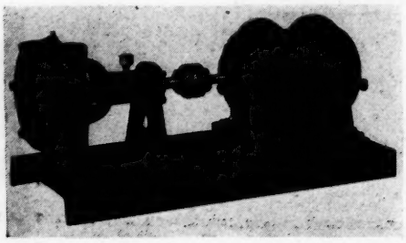
NAME—Worthington centrifugal pump.

PURPOSE—For pumping water.

FEATURES—The manufacturer says that the unit is a low cost, high quality centrifugal pump. Pumps are furnished with direct motor drives or with pulleys for belt drive. The shaft is supported by two ball bearings enclosed in a dirtproof and moistureproof housing. Suction head is easily removed for inspection of the pump's interior. A choice of standard, all-iron, and all-bronze fittings is offered.

SIZE AND CAPACITY — From 10 to 130 g.p.m. with heads from 10 to 100 ft.

MADE BY—*Worthington Pump and Machinery Corp., Harrison, N. J.*



Chadel Dryer

NAME—Chadel dryer.

PURPOSE—A domestic laundry dryer which operates on low-pressure steam.

FEATURES—This dryer is designed to operate with low-pressure steam generated on the premises. It utilizes extended surface copper tube heat transfer coils and a small pressure disc fan. Manufacturer states that with steam at 2-lb. pressure, a three-pass coil dryer will give a final air temperature of 210F. This air temperature is said to maintain 190F in the body of the dryer. Air taken into the dryer is filtered by means of a glass filter.

SIZES — Height, 61 in., width 58 in., and depth 21 in. Weight 310 lb.

MADE BY—*Chadel Drying Co., 347 Madison Ave., New York.*

Sound-Pruf Base

NAME—Fabling Sound-Pruf base.

PURPOSE — For electric motors, fans, and blowers.

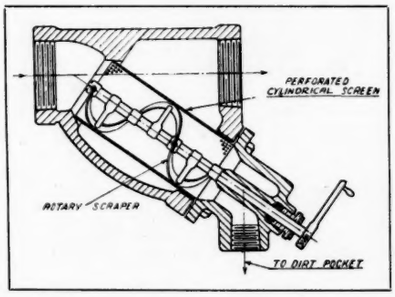
FEATURES—Base consists of floating platform suspended by resilient rubber balls set in recesses between parallel flanges. Number of balls can be adjusted to suit weight and conditions of load.

MADE BY—*W. D. Fabling Co., 2043 Sacramento St., Los Angeles, Cal.*

Sarco Strainer

NAME—Pipe line strainer.

PURPOSE—For installation in pipe lines



ahead of pressure and temperature regulating and reducing valves, and for appliances likely to be damaged or worn by rust or scale.

FEATURES—Fitted with a plunger or rotary scraper within the cylindrical screen, enabling the screen to be cleaned without removal. Particularly suited for use where the flow is continuous and for this service it takes the place of more expensive duplex strainers.

MADE BY—*Sarco Co., Inc., New York.*

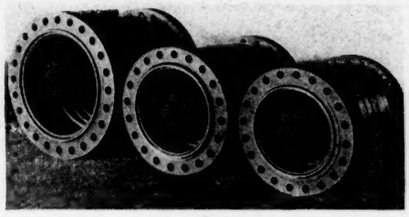
Inco Sheet Metal Deadner

NAME AND MODEL NUMBER—Inco No. 513 Sheet Metal Deadner.

PURPOSE—A flexible insulation and sound deadening material for insulation against sound and heat.

FEATURES—Material is applied by either trowel or spray gun, and sets up in from three to five minutes. Is said not to sag or run when applied ¼ in. thick on a vertical surface. Has sufficient thermal insulating value to prevent condensation under ordinary conditions. Provides waterproof coating for either inside or outside work and is said to be sufficiently pliable to guard against cracks yet hard enough that it will not become sticky or tacky. Its adhesive qualities enable it to make a seal for leaks and joints in ductwork. Where it is necessary to use cork insulation this material can be used as a seam filler. Is an insulator and non-conductor of electricity; rodent and verminproof.

MADE BY — *Inter-Coastal Paint Corp., 13 St. and Southern Railway, East St. Louis, Ill.*



Badger Stainless Steel Expansion Joint

NAME—Badger stainless steel expansion joint.

PURPOSE—For use where high pressures, high temperatures, or corrosion is encountered.

FEATURES — Badger stainless steel joints have the directed flexing feature which is now standard on the company's copper joints. Flexing is progressively controlled throughout the wave-like movement and stresses are kept distributed. At the present time production of stainless steel joints is confined to the flanged end type.

MADE BY—*E. B. Badger & Sons Co., Boston, Mass.*

Electroaire Fanozone Units

NAME—Electroaire Fanozone unit.

PURPOSE — For purifying and removing odors from circulating air.

FEATURES—Unit can be installed on any standard-mounted electric fan.

METHOD OF OPERATION—Unit generates ozone and mixes it with the recirculated air drawn through it by the fan.

MADE BY—*Electroaire Corp., 1455 W. Congress St., Chicago.*

Arcoloy Range Boiler and Tank

NAME AND MODEL NUMBER — Arcoloy Range Boiler and Tank.

PURPOSE—A hot water storage tank.

FEATURES—Tank is made of arcoloy, a patented metal which the manufacturer claims has unusual ability to resist corrosion. The tanks have a burnished finish protected by a light coat of lacquer. All tanks are guaranteed for 20 years.

SIZES AND CAPACITIES—25 to 100 gallons.

MADE BY—*American Radiator Co., 40 West 40 St., New York.*

Air-Maze Filters

NAME—Air-Maze air filter panels.

PURPOSE—A permanent type air filter.

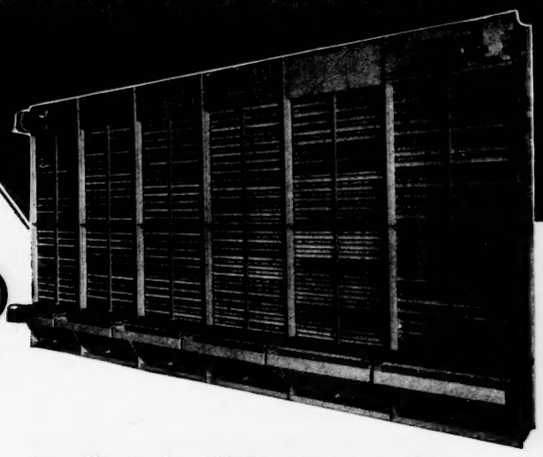
FEATURES—Filter is built up of either 24 or 16 layers of media, starting with 3 x 3 mesh and 5/8-in. or ½-in. separating layers and progressively downward to 16 x 16 mesh and 1/8-in. separating layers. Can be cleaned by washing in a pan of light oil.

SIZES AND CAPACITIES—Stock sizes are 2 and 4 in. thick in 10 x 20, 20 x 20, and 16 x 24 in. Other sizes made to order.

MADE BY—*Air-Maze Corp., 1812 Huron Rd., Cleveland, Ohio.*

3 of a kind... all DEPENDABLE

DOUBLE DUTY
AUTOMATIC AIR FILTER



An all steel, self-cleaning, non-clogging filter designed on the true impingement principle for commercial and large building installations. Capacities from 3,000 CFM. to 600,000 CFM.

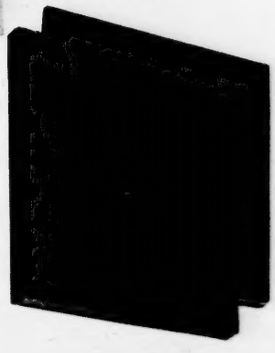
Cross-section view of "DOUBLE-DUTY" filter showing simplicity of self-cleaning operation.

KOMPAK
DRY FABRIC AIR FILTER

Renewable medium for general ventilation and industrial air filtration. Each unit contains 27 sq. ft. high grade cotton medium affording extremely large filtering surface. Rated 600 CFM. velocity thru medium 22 1/2 FPM.

THE PERMO PAD
REPLACEMENT AIR FILTER

A washable—waterproof—acidproof—low resistance filter for small ventilating and air conditioning systems. Progressive packing of fine textured fibres provides large dust storage space. Rated 800 CFM.



"INDEPENDENT"

INDEPENDENT AIR FILTER COMPANY
215 WEST OHIO STREET, CHICAGO, ILLINOIS
Representatives in all principal cities

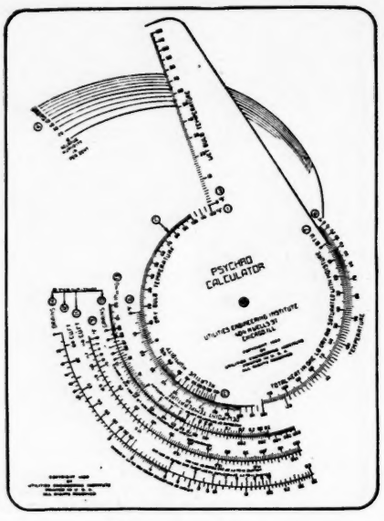
Psychrometric Calculator

NAME—Utilities Engineering Institute's Psychro Calculator.

PURPOSE—A calculator to be used for determining psychrometric values and properties of air and water vapor mixtures.

FEATURES—Calculator is 7½ x 10½ in. and has surface finish which can easily be cleaned.

MADE BY—*Utilities Engineering Institute, 404 N. Wells St., Chicago.*



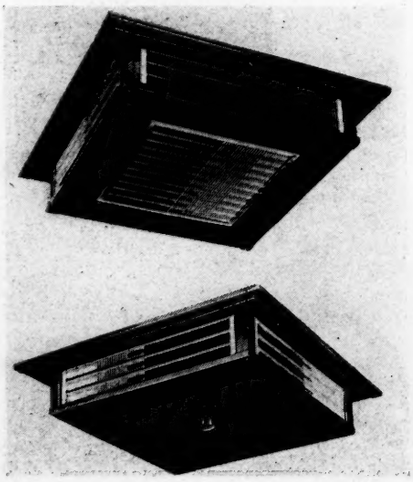
Barber-Colman Uni-Flo Ceiling Grilles

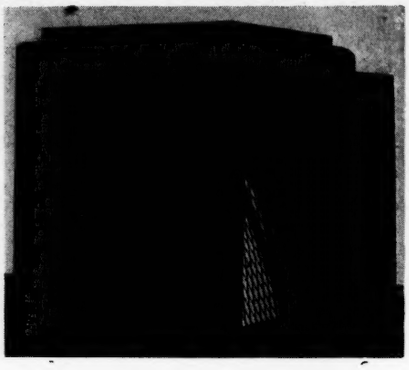
NAME—Uni-Flo ceiling supply grille and Uni-Flo combination supply and exhaust ceiling grille.

PURPOSE—Supply grille is for supplying conditioned air to room while the combination grille supplies conditioned air and also removes the exhaust air.

FEATURES—Grilles are additions to the Uni-Flo line. In the combination supply and exhaust grille (upper photo) air is discharged through multi-direction grilles in the sides and returned through the center grille at the bottom. The stack collars on this grille are arranged for the double ducts which are necessary. The grille is particularly adapted for use for furred ceilings. In the supply grille (lower photo) air is supplied through the openings on the sides.

MADE BY—*Barber-Colman Co., Rockford, Ill.*





Vik-Air DeLuxe Conditioner

NAME—Three-speed Vik-Air conditioner.

PURPOSE—For use with warm air furnaces to supply cleaned and forced air.

FEATURES—Three-speed operation, two lower speeds for winter use and high speed for summer circulation. Filters are so arranged that they may be used to filter the air from the basement during the summer and clean the air from upstairs in the winter. Self-adjusting motor base which is said to keep a constant tension on fan belt drive. Rubber mountings used on motor and blower to prevent the transmission of vibrations.

SIZES AND CAPACITIES—Five sizes ranging from 1,000 c.f.m. to 3,500 c.f.m. high speeds.

MADE BY—*Viking Air Conditioning Corp., 1935 Euclid Ave., Cleveland, Ohio.*

Steamfitters Vise

NAME—Athol heavy duty steamfitters vise.

PURPOSE—Heavy pipe vise designed to meet the needs of steamfitters.

FEATURES—A special type extra-heavy, semi-steel base and jaws. Deeply checked tool-steel flat jaw facings.

SIZES AND CAPACITIES—⅛- to 6-in. pipe.

MADE BY—*Athol Machine & Foundry Co., 621 S. Kolmar Ave., Chicago.*

Westinghouse Fan Cooled Motors

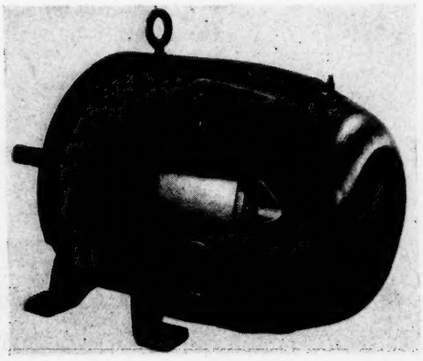
NAME—Type SK explosion-tested, fan-cooled, direct d.c. motors.

PURPOSE—For use in locations where explosive gases or dust may exist.

FEATURES—These motors are designed to withstand an internal explosion of gas or coal dust without injury to the equipment and without emitting flames or sparks which would ignite surrounding gas. A fan on the commutator end forces a large volume of cooling air through air passages in the motor.

SIZES AND CAPACITIES—5 to 75 hp. with 115, 230, and 550 volts.

MADE BY—*Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.*

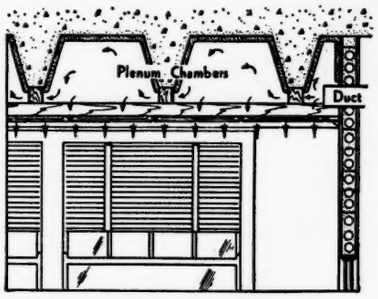


Burgess Acousti-Vent

NAME—Burgess Acousti-Vent.

PURPOSE—Combined air inlet and sound deadening ceiling.

FEATURES—System comprises a perforated ceiling made of a suitable architectural surface installed slightly below the normal ceiling level of the room. Between the perforated sheet and room ceiling is a sound absorbing material that is installed with sufficient clearance so that a space is provided between the sound absorption material and the ceiling. This space serves as a plenum chamber into which air is introduced through ducts. Air flows uniformly through the perforated ceiling into all parts of the room.



Side Elevation Showing Plenum Chambers above Burgess Acousti-Vent Ceiling

Room noises, upon reaching the perforated metal ceiling, seep through the small perforations and encounter the resilient sound absorbing material. Sound waves are absorbed, causing a reduction in the noise level of the room.

MADE BY—*C. F. Burgess Laboratories, Inc., Chicago.*

Davies Filteraire

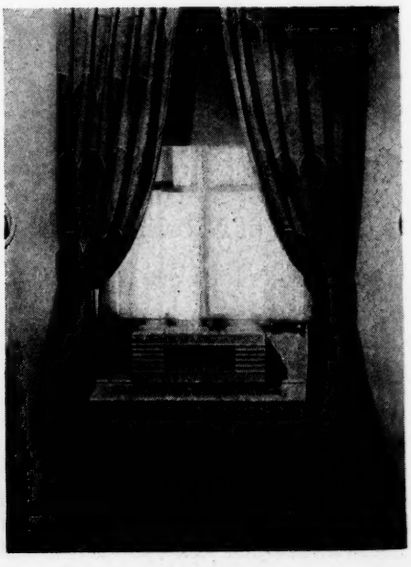
NAME AND MODEL NUMBER—1936 model Filteraire unit.

PURPOSE—Circulating, filtering, and sound absorption unit for window application.

FEATURES—Has large centrifugal blower, Airplex air filter, and silencer. Finished in old ivory.

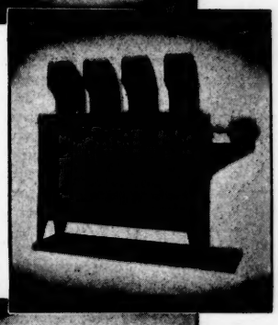
SIZES AND CAPACITIES—450 c.f.m. Available for a.c. or d.c. current.

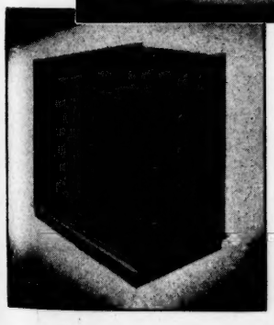
MADE BY—*Davies Air Filter Corp., 390 Fourth Ave., New York.*



"Thanks a Million!"

YOU MADE 1936 THE BIGGEST YEAR CLARAGE EVER HAD





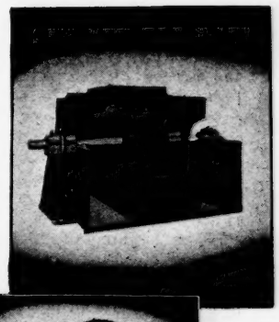
More Clarage equipment was specified and purchased during the last twelve months than in any previous year in Clarage history.

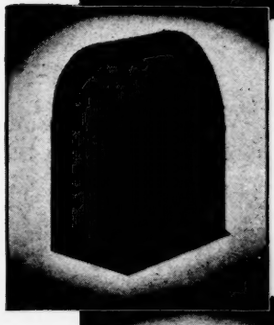
1936 set a new high—our biggest year by a wide margin, requiring two additions to our manufacturing capacity. It was the most emphatic endorsement we have ever received of Clarage quality standards.

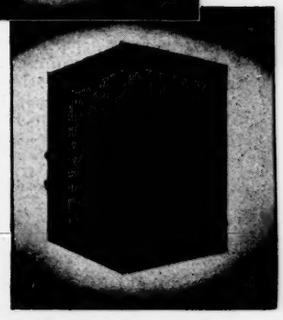
To you—architects, engineers, contractors, business executives—who demonstrated your unmistakable preference for Clarage products in 1936, we repeat: **"Thanks a Million!"**

And to you, who are not as yet familiar with Clarage products, we invite a thorough investigation of our facilities. We build fans, blowers, mechanical draft apparatus, unit heaters, coolers, conditioning units and systems—**to meet any requirement**—expertly designed, faithfully constructed.

There must be—**and there are**—sound reasons for Clarage's enviable standing in the air handling and air conditioning industry.

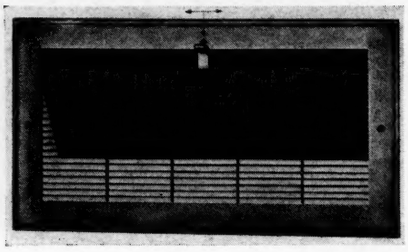






COMPLETE AIR CONDITIONING
VENTILATION...HEATING...COOLING

FANS FOR INDUSTRIAL NEEDS
MECHANICAL DRAFT EQUIPMENT



United States Close-Space Air Conditioning Register

NAME—United States Close-Space air conditioning register.

FEATURES—Narrow deep fin bars obstruct all view of the interior. A special screw at the top of the register and back of the operating levers limits the opening of the damper for any desired volume, yet permits closing of the damper after the register is adjusted and set with this recessed screw. The set screw is covered with paint when the register is finished. The depth of the fin bars is ¾ in., spacing is 3/16 in., and the width of the dampers 1 in.

MADE BY—*United States Register Co., Battle Creek, Mich.*

Arco Floor and Ceiling Plate

NAME AND MODEL NUMBER—Arco Floor and Ceiling Plate.

PURPOSE—A floor and ceiling plate made especially for installing on copper pipe used on inside installations in plumbing, heating, air conditioning and refrigeration systems.

PURPOSE—Plate has a special spring on the inside diameter which grips the pipe and is said to hold the plate snugly in place without annoying rattles. It has a non-tarnish chrome finish.

SIZES AND CAPACITIES—⅜ to 1 in.

MADE BY—*American Radiator Co., 40 West 40 St., New York.*

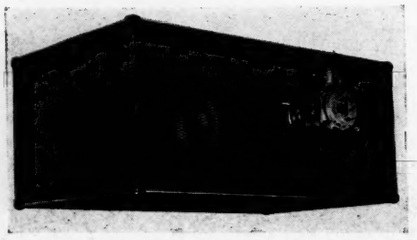
Young Self-Contained Air Conditioning Unit

NAME—Young self-contained air conditioning unit.

PURPOSE—Circulating, heating, cooling, humidifying, dehumidifying, and cleaning.

FEATURES—Has continuous fan operation at all temperatures below 50° outside temperature. Above this the fan operates intermittently. As the temperature falls lower than 50° the cold walls of the room cause the air to stratify rapidly, and by the use of a tempering coil and continuous fan operation stratification is avoided in cold weather. Constant fan operation is also recommended for summer operation.

MADE BY—*Young Radiator Co., Racine, Wis.*



Air Conditioning Coils

NAME AND MODEL NUMBER—Standard all-copper air conditioning coils, series 750.

PURPOSE—For heating or cooling air in air conditioning systems.

FEATURES — Manufacturer claims a permanent metal-to-metal contact between fin and tube obtained by hot tinning after fabrication and assembly, and the bond is said to assure a definite cooling rate which exceeds that of coils in use at the present time. It is also claimed that the metal dipping eliminates oxidation and since the coils remain cleaner they are said to have a higher operating efficiency.

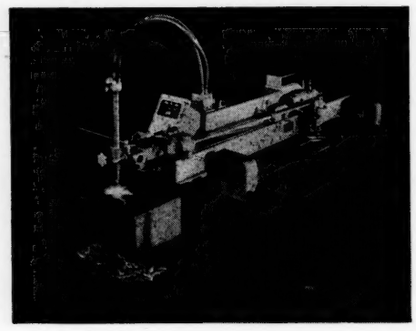
SIZES AND CAPACITIES—Face areas from 1 to 10 sq. ft. up to 12 rows deep. Capacities, at 85F dry bulb, 50% R.H., entering air 500 f.p.m. face velocity, from 6,000 B.t.u. per hr. and up. Coils also built to order for special installations.

MADE BY — *Standard Galvanizing Co., Air Conditioning Coil Div., 2613 W. Van Buren St., Chicago.*

Linde Oxweld Cutting Machine

NAME AND MODEL NUMBER — Oxweld type CM-12 shape cutting machine.

PURPOSE—Flame cutting machine for cutting shapes of all descriptions out of metal, up to 12 in. thick and over.



FEATURES — The manufacturer states that any shape from the simplest to the most complicated can be accurately produced either automatically with templets or guided by hand. Cuts as long as 144 in. are said to be possible and they can be made at any desired angle in the horizontal plane. The apparatus can also be used for multiple cutting as it is designed to carry from 2 to 5 blowpipes.

MADE BY—*The Linde Air Products Co., 205 East 42 St., New York.*

Davies Airplex Filters

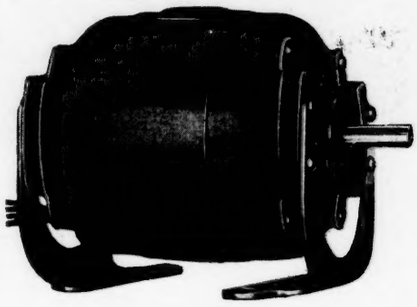
NAME—Davies Airplex dry air filters.

PURPOSE—Cleaning air.

FEATURES—Filter medium of the Airplex is a specially processed cotton, lightly glazed on both sides to prevent disintegration. Each unit contains about 30 sq. ft. of this filter medium. Large surface is obtained by folding the material into 4-in. pleats forty-two times inside the cartridge or box. It is said that the filtering material is not affected by humidity. Filters are serviced by replacing the complete cartridge after it accumulates its maximum load of dust which, under average operating conditions, occurs every two to three months. For special applications, manufacturer can supply a filter medium which is chemically treated so that it is fire retarding and will only char in contact with a flame.

SIZES AND CAPACITIES—Normal rating is 800 c.f.m. per unit with an initial resistance of 0.18 in. of water. The standard size is 20 x 20 x 4 in. 22 x 20 x 2 in. and 16 x 25 x 2 in. sizes are also available.

MADE BY—*Davies Air Filter Corp., 390 Fourth Ave., New York.*



Bodine Mounting Base

NAME—Resilient mounting base.

PURPOSE—A resilient mounting base for fractional horsepower motors.

FEATURES—The motor is carried by live rubber in shear which is said to be a more efficient absorber of vibration than rubber in compression or tension. The manufacturer states that despite its high resilience, the mounting is unusually stable and that measurements show that a bending torque on the shaft changes the relative position of the motor frame but slightly.

MADE BY—*Bodine Electric Co., 2254 W. Ohio St., Chicago.*

L-R Flexible Coupling

NAME AND MODEL NUMBER — L-R Type W flexible coupling.

FEATURES — Individual load cushions are free floating between the metal jaws and rest upon the central hub, and are held in place by a spiral steel spring. Cushion available in three types of materials, one being a brake lining material, a second of belting leather, and a third of rubber duck fabric.

SIZES AND CAPACITIES—In standard size with bores from 3 to 14 in.

MADE BY—*Lovejoy Tool Works, Chicago.*

Adsco-Bannon Tile Conduit

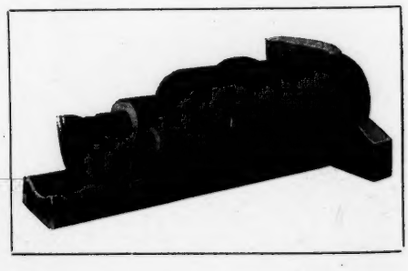
NAME—Adsco-Bannon tile conduit.

PURPOSE—Conduit for underground steam and hot water lines.

FEATURES—Conduit consists of a substantial base drain tile supporting a circular salt glazed vitrified tile conduit. The tile conduit, with bell and spigot joints in approximately 2-ft. lengths, is separable on the job into two halves. The bottom half of the conduit is placed on the base drain, the joints mortared and the trench back filled to approximately the top of the half section of the conduit. Pipe rollers or multiple pipe supports with rollers are placed in recesses in the two horizontal reinforcing ribs which are in the bottom of the pipe support sections of the conduit. The pipe supports are held rigid without piercing the conduit wall. One or more pipes can be installed, tested, inspected, and insulated before the top half of the conduit is placed.

TYPES AVAILABLE—Conduit is available in various sizes to accommodate one or more pipes with or without insulation.

MADE BY—*American District Steam Co., North Tonawanda, N. Y.*



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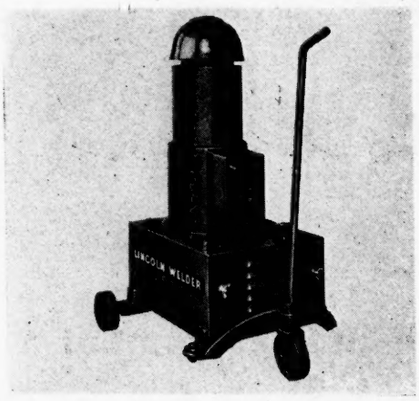


Lincoln Welding Machine

NAME AND MODEL NUMBER—Arc Welding Machine, model SA-150.

PURPOSE—Intended for a wide variety of applications, such as sheet metal work, pipe welding, cast iron repair and regular production welding.

FEATURES—Unit is insulated with Class B insulation which, the manufacturer claims, insures it against burn outs and permits sustained overloads without injurious effect. Can be used with either bare or shielded arc type electrodes. Has a dual control of voltage and current, allowing independent adjustment of arc heat and arc penetration to suit the welding application.

SIZES AND CAPACITIES — Available for 60 cycle power circuits of 220 or 440 volts, three or two phase. Rated current range of 45 to 200 amperes. Either portable or stationary models are available.

MADE BY—*The Lincoln Electric Co., Cleveland, Ohio.*

Jenkins Solder-End Valves

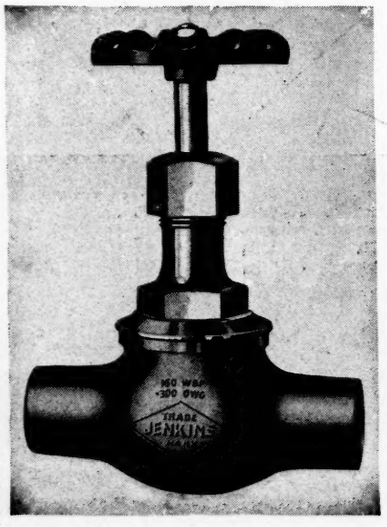
NAME—Jenkins solder-end valves.

PURPOSE—Standard valves for installation on soldered copper pipes or tubes.

FEATURES—These valves are identical with the standard Jenkins valve in every detail except for the ends which are so designed to make possible soldered connection to copper lines. Either globe, angle, or lift check valves are available.

SIZES AND CAPACITIES—For installation on ¼ in. to 3 in. lines.

MADE BY — *Jenkins Bros., 80 White St., New York, N. Y.*



Century Water Heater

NAME—Century water heater.

PURPOSE—Hot water heater for commercial or residential applications.

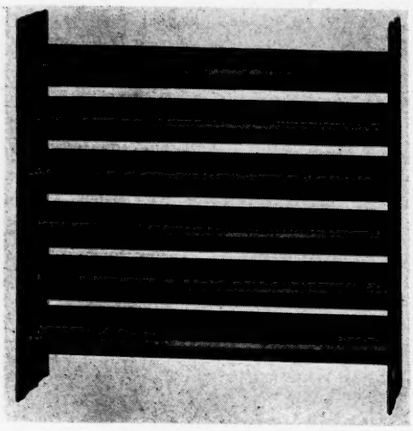
FEATURES — Heater utilizes a model 10 burner and consumes from 1¼ to 1½ gal. of oil per hour.

MADE BY—*Century Engineering Corp., Cedar Rapids, Ia.*

Tuttle & Bailey Ducturns

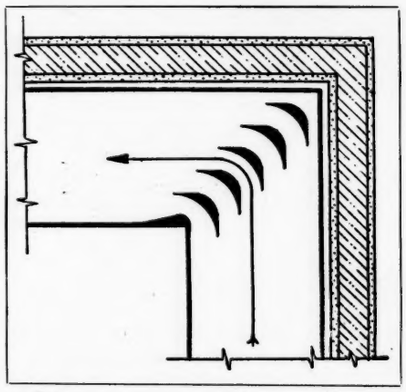
NAME—Ducturns.

PURPOSE—For insertion in right angle duct elbows to eliminate use of long radius elbows.



T & B Ducturns.

FEATURES — Consist of tubular blades so shaped that they are spaced at regular intervals. All points on the periphery of one blade are equidistant from similar points on an adjacent blade. Use of Ducturns avoids the loss of energy inherent in use of one piece splitters. Principal advantage is that all ductwork is made with right angle turns and can easily be concealed. In addition, the expense is lowered.



Section of elbow showing Ducturns.

SIZES AND CAPACITIES—Made into two types of blades in wide range of sizes.

MADE BY — *Tuttle & Bailey, Inc., New Britain, Conn.*

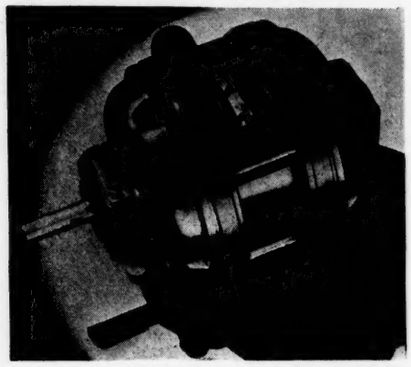
Inland Hi-Steel

NAME—Hi-Steel.

PURPOSE—A corrosion-resistant steel said to have a high degree of uniformity and physical characteristics as well as workability.

FEATURES—Has minimum yield point of 60,000 lb. per sq. in. for gages lighter than ¼ in., and 55.000 lb in high strength. Minimum ultimate tensile strength is 70,000 lb. per sq. in.

MADE BY—*Inland Steel Co., Chicago, Ill.*



G-E Squirrel Cage Motors

NAME — G-E squirrel-cage polyphase induction motors.

PURPOSE—For applications requiring open, sleeve or ball bearing, enclosed, enclosed fan-cooled, splashproof and vertical motors.

FEATURES—Stator coiled windings which are insulated with a material which has a higher resistance to moisture and other influences such as mild acids, alkalis, oil, and abrasion. A new frame provides increased resistance to vibration and shock. Convenience features include: two-part conduit boxes which can be mounted in any one of four positions; knock-off legs on end shields, adequate wrench room for removing end-shield cap screws; ball bearings provided with pressure grease fitting and relief plug; sleeve bearings equipped with oil-filler gage that can be placed on either side of housing.

SIZE—From 1 to 15 hp. at 1,800 r.p.m.

MADE BY—*General Electric Co., Schenectady, N. Y.*

Independent Permo Pad Air Filter

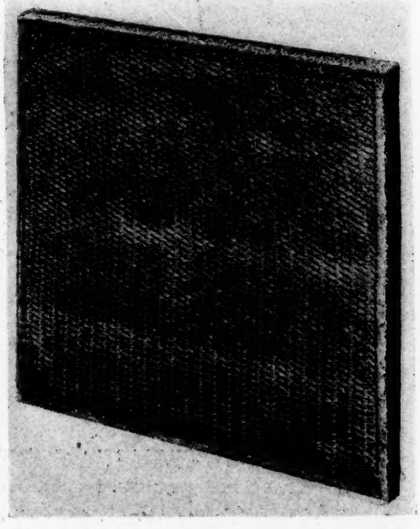
NAME—Permo Pad air filter.

PURPOSE—Filtering air.

FEATURES—The manufacturer claims that the filter is a washable, moistureproof, and acidproof unit which is odorless, sterile, and has a large storage capacity. Filtering material is loosely packed on the entering air face and densely packed on the exit side so as to extend the usefulness. Manufacturer says that it can be readily cleaned either by beating or by washing in hot water, steam, or naphtha. The initial resistance of a single pad is 0.09 in. water gage.

SIZES AND CAPACITIES—Standard sizes ranging from 10 x 10 x 2 in. to 20 x 30 x 2 in. with capacities from 200 c.f.m. to 1,200 c.f.m

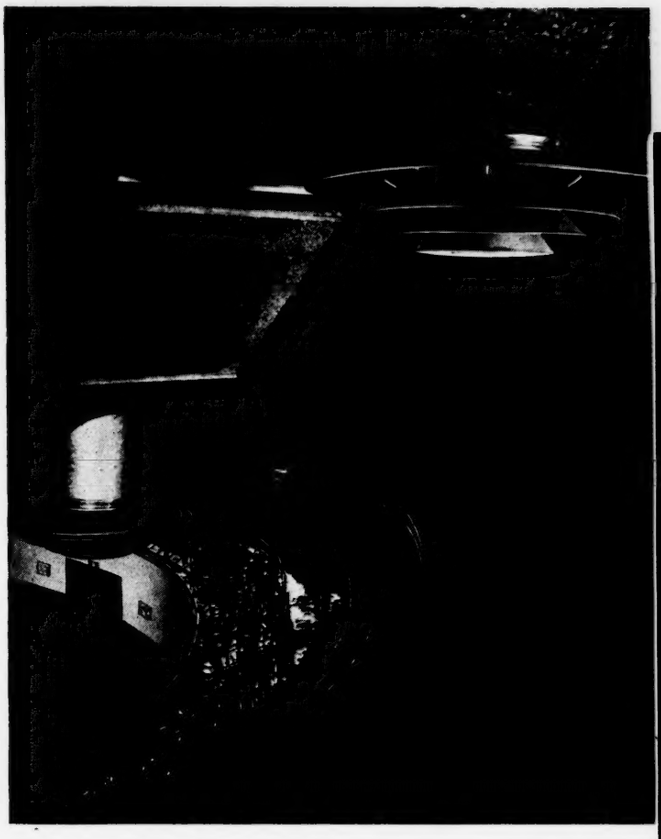
MADE BY—*The Independent Air Filter Co., 215 W. Ohio St., Chicago.*

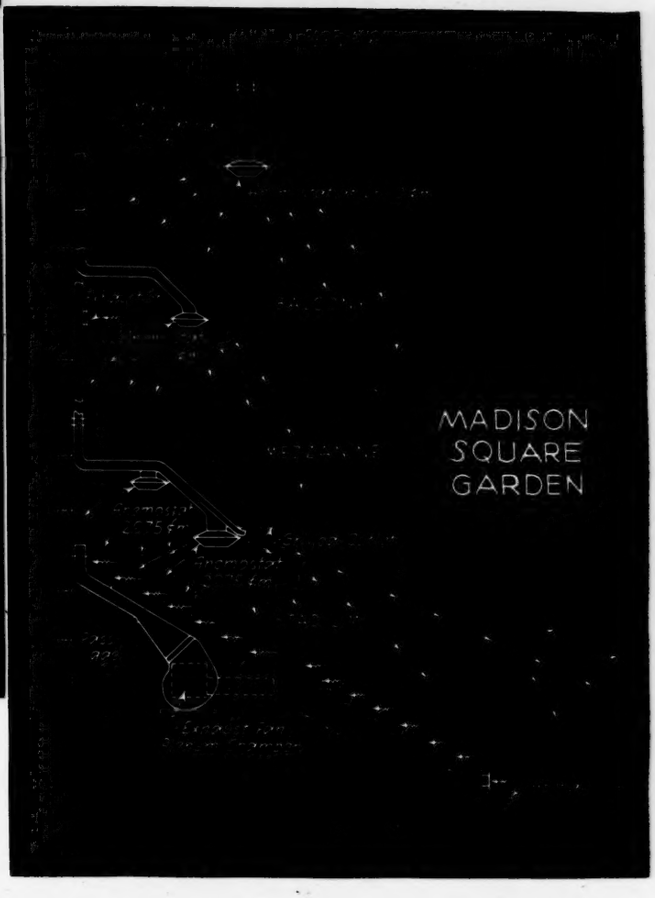


ANEMOSTAT

Gives Draftless Air Distribution

To 18,500 Spectators at Madison Square Garden





"No Air Conditioning System is better than its Air Distribution"

The 18,500 sport fans that pack "The Garden" sit in perfect comfort through hours of entertainment whilst, unknown to them, 102 ANEMOSTATS draftlessly distribute 400,000 c.f.m. of conditioned air at 1200 f.p.m. duct velocity throughout the entire auditorium. The ANEMOSTAT thus greatly contributes to the efficient operation of the Madison Square Garden Air Conditioning Plant.

The ANEMOSTAT is an accepted scientific achievement. It has solved major problems of the Air Conditioning Industry by reducing the speed of air flow to such an extent that it is no longer perceptible as a draft and by mixing room air with conditioned air within the device. Its use, therefore, permits greater temperature differentials. smaller ducts, smaller plants, lower installation and operating costs. The ANEMOSTAT can be applied to existing systems as well as to new installations.

A FEW TYPICAL INSTALLATIONS

S. S. "QUEEN MARY" ENGINE ROOMS	THOMPSON RESTAURANTS
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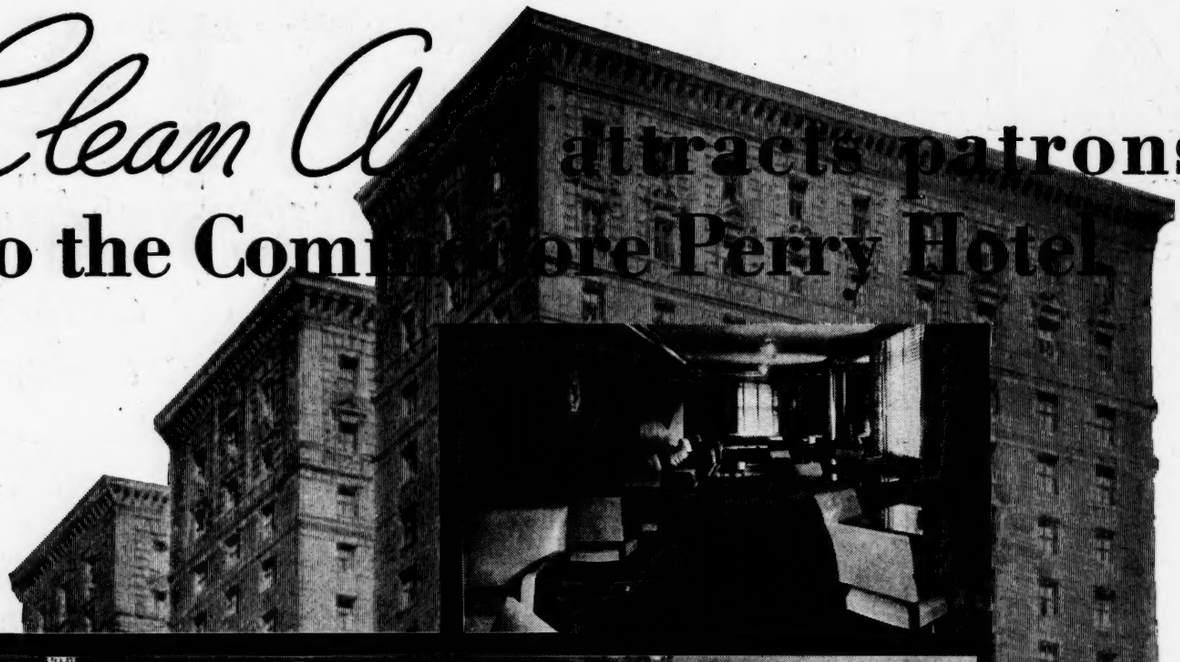
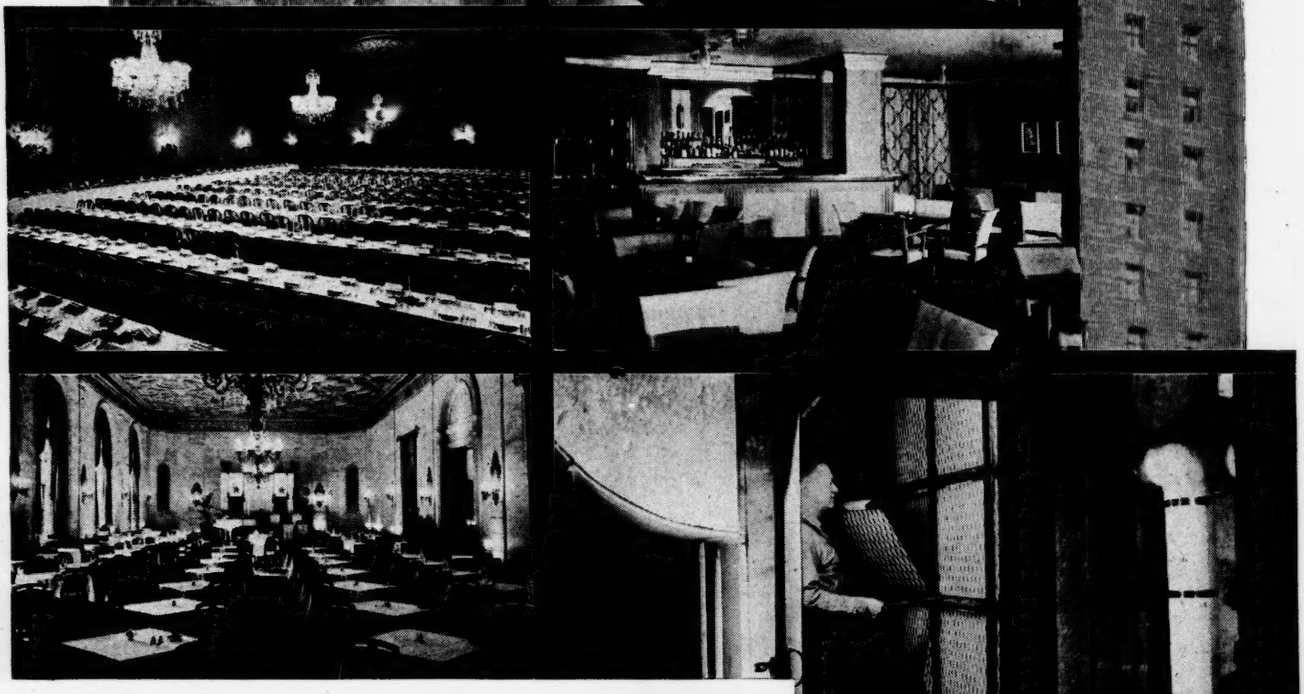
NEW YORK CITY

Clean A attracts patrons to the Com[illegible]ore Perry Hotel



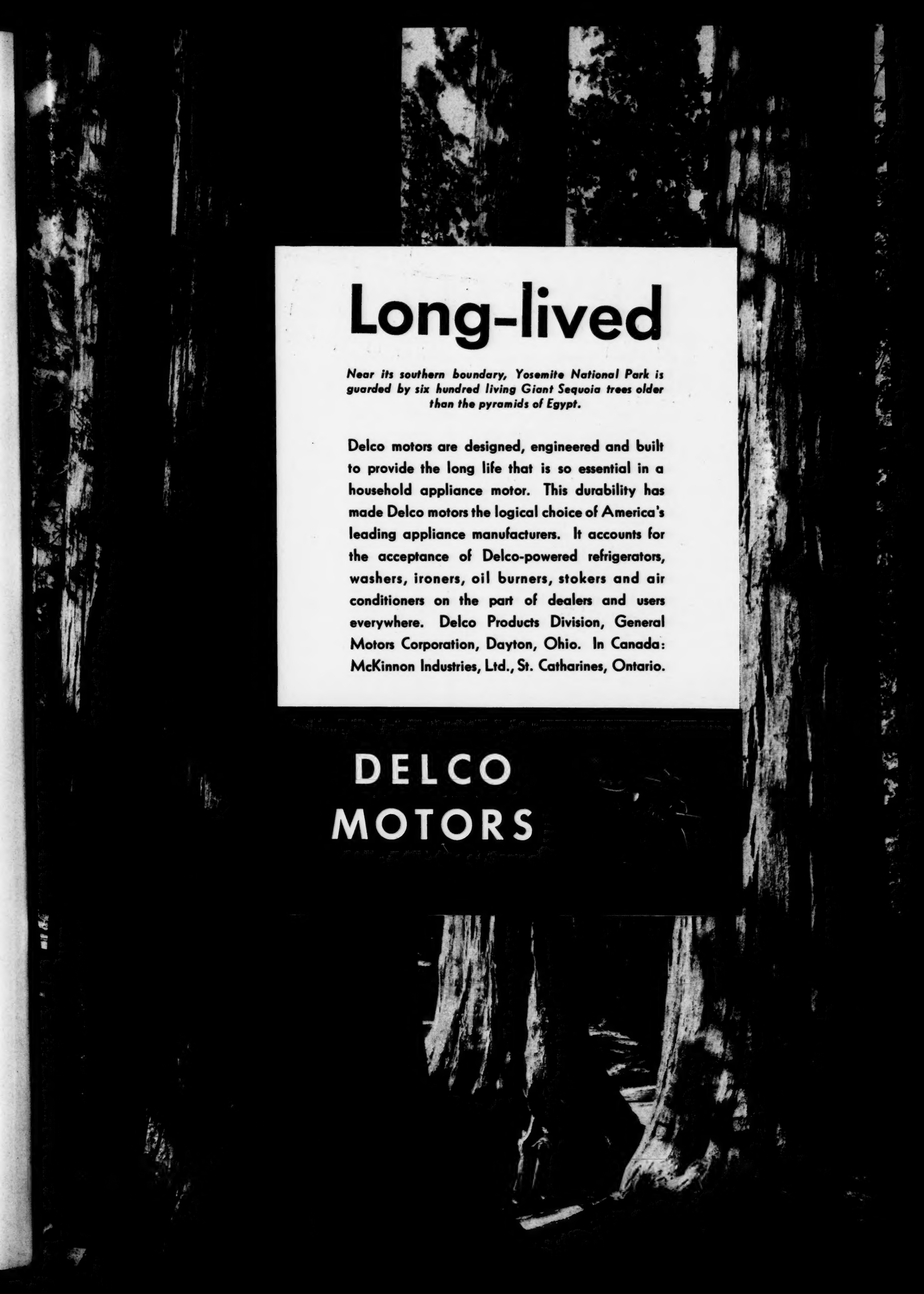


■ **Both Mr. Daniel J. O'Brien, managing director of the Commodore Perry Hotel in Toledo, and Mr. V. W. Fawcett, building superintendent are most enthusiastic in their praise of Dust-Stop Air Filters. The former, because the continuous flow of Clean Air adds so much to the comfort of guests; and the latter, because of the high efficiency, ease of handling and low replacement cost of Dust-Stop.**
Owens-Illinois Glass Company . . . Toledo, Ohio.

Illustration shows 3x4 filter assembly with a capacity of 9600 c.f.m. Cleans air in Travertine room and Continental Bar. In addition, a Westinghouse installation with a 3 x 3 Dust-Stop Filter assembly cleans air in Grand Ball Room. Hoffman and Harpst, Heating, Ventilating and Air-Conditioning Contractors. Mills, Rhines, Bellman and Nordhoff, Architects.

Dust-Stop Air Filters are standard equipment in leading warm-air heating systems and air-conditioning units.

DUSTOP AIR FILTERS



Long-lived

Near its southern boundary, Yosemite National Park is guarded by six hundred living Giant Sequoia trees older than the pyramids of Egypt.

Delco motors are designed, engineered and built to provide the long life that is so essential in a household appliance motor. This durability has made Delco motors the logical choice of America's leading appliance manufacturers. It accounts for the acceptance of Delco-powered refrigerators, washers, ironers, oil burners, stokers and air conditioners on the part of dealers and users everywhere. Delco Products Division, General Motors Corporation, Dayton, Ohio. In Canada: McKinnon Industries, Ltd., St. Catharines, Ontario.

DELCO
MOTORS

BE READY FOR A BIGGER AIR CONDITIONING *Year!*

•STREAMLINE COPPER PIPE AND FITTINGS

TRADE MARK REG. U. S. PAT. OFFICE

Best FOR ANY PIPING JOB

● NINETEEN THIRTY-SEVEN is going to be a big year in the Air Conditioning field—and a big year too for STREAMLINE Copper Pipe and Solder Fittings.

There is no material as modern and practical as STREAMLINE Copper Pipe and Solder Fittings for most piping jobs. They provide free flowing, non-clogging, and non-rusting lines for hot and cold water, for heating systems, for the manufacture of Air Conditioning equipment, and a multitude of other applications.

The STREAMLINE Fitting, the original solder type fitting, has been giving the utmost in pipe line satisfaction for the past six years in every type of building construction and in thousands of industrial applications throughout the United States and Canada.

The STREAMLINE Solder Fitting is a cast bronze fitting—rigid and strong, it's pipe openings are machined to accurate capillary fit for the pipe—and more than that, they stay perfectly round and retain their proper tolerance, even when subjected to the intense heat required when high melting point solders are used.

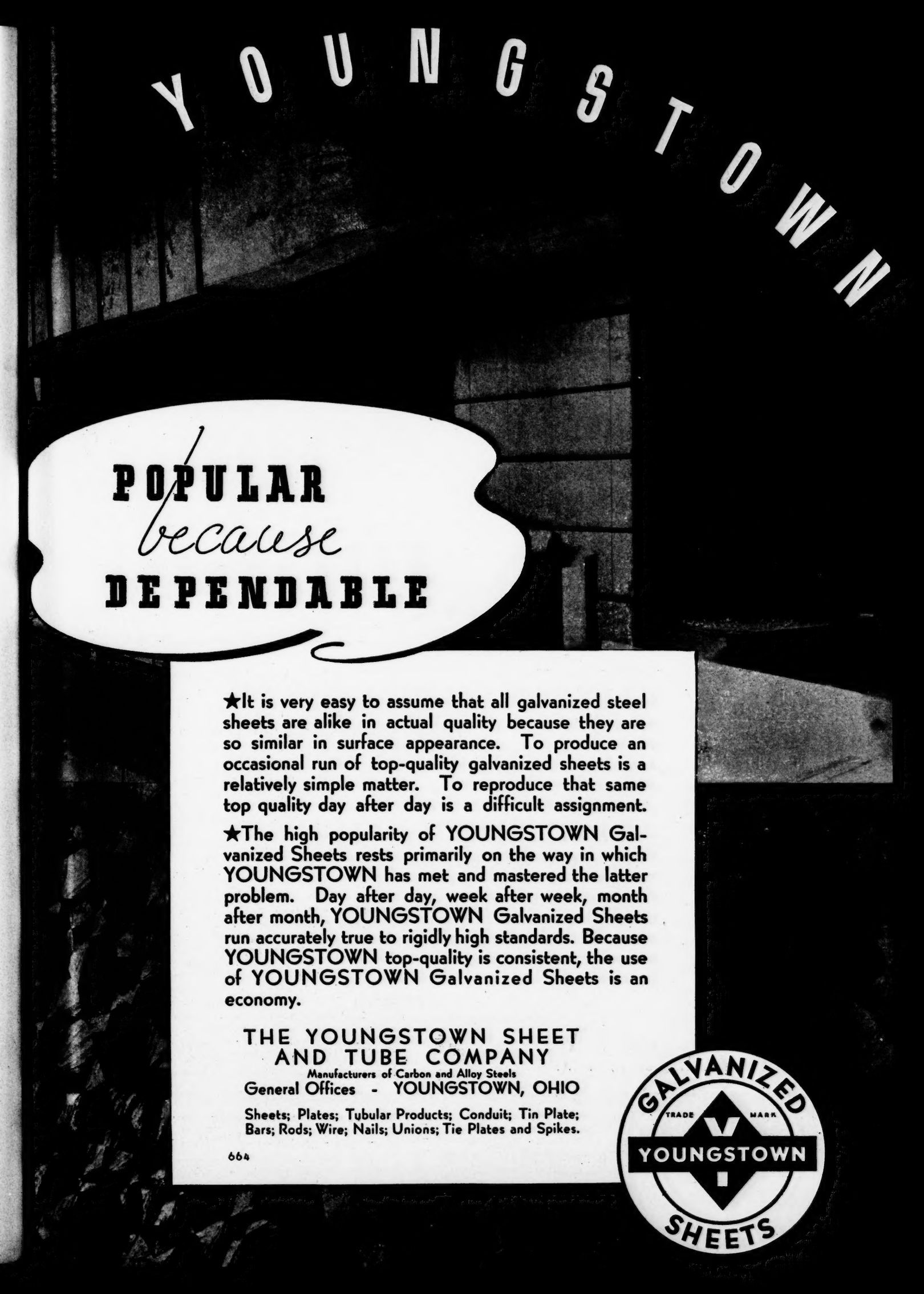
STREAMLINE Copper Pipe is a greatly improved pipe of uniform diameter, and consistently close tolerance. It is intended for use with STREAMLINE Fittings, and for best results, these two reliable pipe line essentials should always be used together.

STREAMLINE Solder Fittings are manufactured in sizes from 1/4" to 12" inclusive, and in a complete range of reductions in tees and elbows. You connect directly to the smaller or larger pipe lines without the use of adapters with their additional expense, both for material and labor. A BETTER JOB—A LESS EXPENSIVE JOB—AND A MORE WORKMANLIKE JOB.

Make STREAMLINE Copper Pipe and STREAMLINE Solder Fittings your pipe line standards for 1937.

● The word STREAMLINE is the exclusive Trade Mark of the Mueller Brass Co., Port Huron, Michigan.

STREAMLINE
PIPE AND FITTINGS DIVISION
MUELLER BRASS CO.
PORT HURON, MICHIGAN



POPULAR *because* DEPENDABLE

★It is very easy to assume that all galvanized steel sheets are alike in actual quality because they are so similar in surface appearance. To produce an occasional run of top-quality galvanized sheets is a relatively simple matter. To reproduce that same top quality day after day is a difficult assignment.

★The high popularity of YOUNGSTOWN Galvanized Sheets rests primarily on the way in which YOUNGSTOWN has met and mastered the latter problem. Day after day, week after week, month after month, YOUNGSTOWN Galvanized Sheets run accurately true to rigidly high standards. Because YOUNGSTOWN top-quality is consistent, the use of YOUNGSTOWN Galvanized Sheets is an economy.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

Sheets; Plates; Tubular Products; Conduit; Tin Plate; Bars; Rods; Wire; Nails; Unions; Tie Plates and Spikes.

664

GALVANIZED TRADE MARK YOUNGSTOWN SHEETS

Coming thru CLEAN!

So convincing were the results from tests made by the railroads with permanent filters that today more than 7000 mechanically air conditioned cars are equipped with American M-W washable filters at an initial cost from five to six times that of renewable types.

The railroads have proved that clean air at minimum cost does not mean the purchase of the cheapest filter that will answer the purpose, but the type that meets requirements in the most economical manner. American Viscous type filters clean the air so thoroughly that trains passed through the worst dust storms with hardly a trace of dust entering the cars. The rise in resistance with dust accumulation is so gradual that an adequate supply of air is provided at all times.

Write for complete information on American Permanent Type Filters. Ask for Bulletin No. 201-B.

AMERICAN AIR FILTER COMPANY, Inc.
INCORPORATED
118 CENTRAL AVENUE, LOUISVILLE, KY.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

THE following railroads and companies specializing in railway air conditioning, now have in service more than 14,000 American Air Filters of the permanent viscous type:

Atchison, Topeka & Sante Fe
E. G. Budd Mfg. Co. . Canadian National R. R.
Canadian Pacific R. R. . Illinois Central System
Chicago, Burlington & Quincy
Chicago, Milwaukee, St. Paul & Pacific
Chicago, Rock Island & Pacific
Chicago & Northwestern . Louisville & Nashville
New York Central . . . Norfolk & Western
The Pullman Co. . . . . Southern Pacific
The Pullman-Standard Car Co.
Southern Railway . . . . . Texas & Pacific
Texas & New Orleans . . . . Union Pacific
Central of Georgia Ry. Co.
Chesapeake & Ohio Ry. Co.
Boston & Albany R. R. . . Boston & Maine R. R.
Carrier Engineering Corp.
Colorado & Southern Railway
Fort Worth & Denver City
Great Northern Ry. . . . Lehigh Valley R. R.
Chicago, St. Paul, Minn. & Omaha
Gulf, Mobile & Northern

AMERICAN AIR FILTERS

Stator is built to meet the exacting requirements of hard continuous service. Rugged, welded all steel frame—strong, rigid, unbreakable. Especially impregnated and fully taped windings.

Wagner motors are equipped with large oil wells and have special lubrication systems so that only occasional lubrication is necessary.

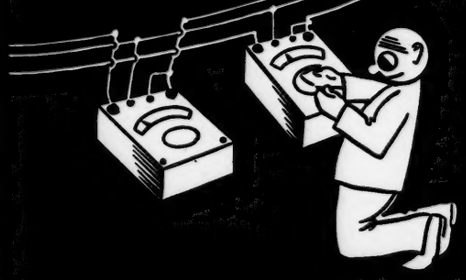
2

The shaft height and base dimensions are in accordance with N. E. M. A. standards. Feet are welded to frame—accurately spaced according to Wagner dimensional diagram sheets.

4

Rotor is balanced to insure freedom from vibration which causes noise. The slots are skewed to reduce magnetic noise and to eliminate variations in torque for different positions of the rotor.

3



Tests of Wagner motors under actual load conditions have determined the performance characteristics that are most desirable for satisfactory operation.

5

Motors FOR AIR-CONDITIONING EQUIPMENT

Should Meet These Requirements:

1. They should be dependable—able to give continuous, faithful service without failure.
2. They should require very little maintenance other than periodic inspection and lubrication.
3. They should be quiet—with no magnetic or other noises to cause annoyance to users.
4. Their construction features and mounting dimensions should be such as to be readily adaptable to the design of the air conditioner.
5. They should have the necessary electrical and mechanical characteristics to adequately and efficiently meet the starting, running and overload requirements of the equipment.

Wagner Air Conditioner Motors embody all these requisites of Well-Balanced Design.

ML 887-1L

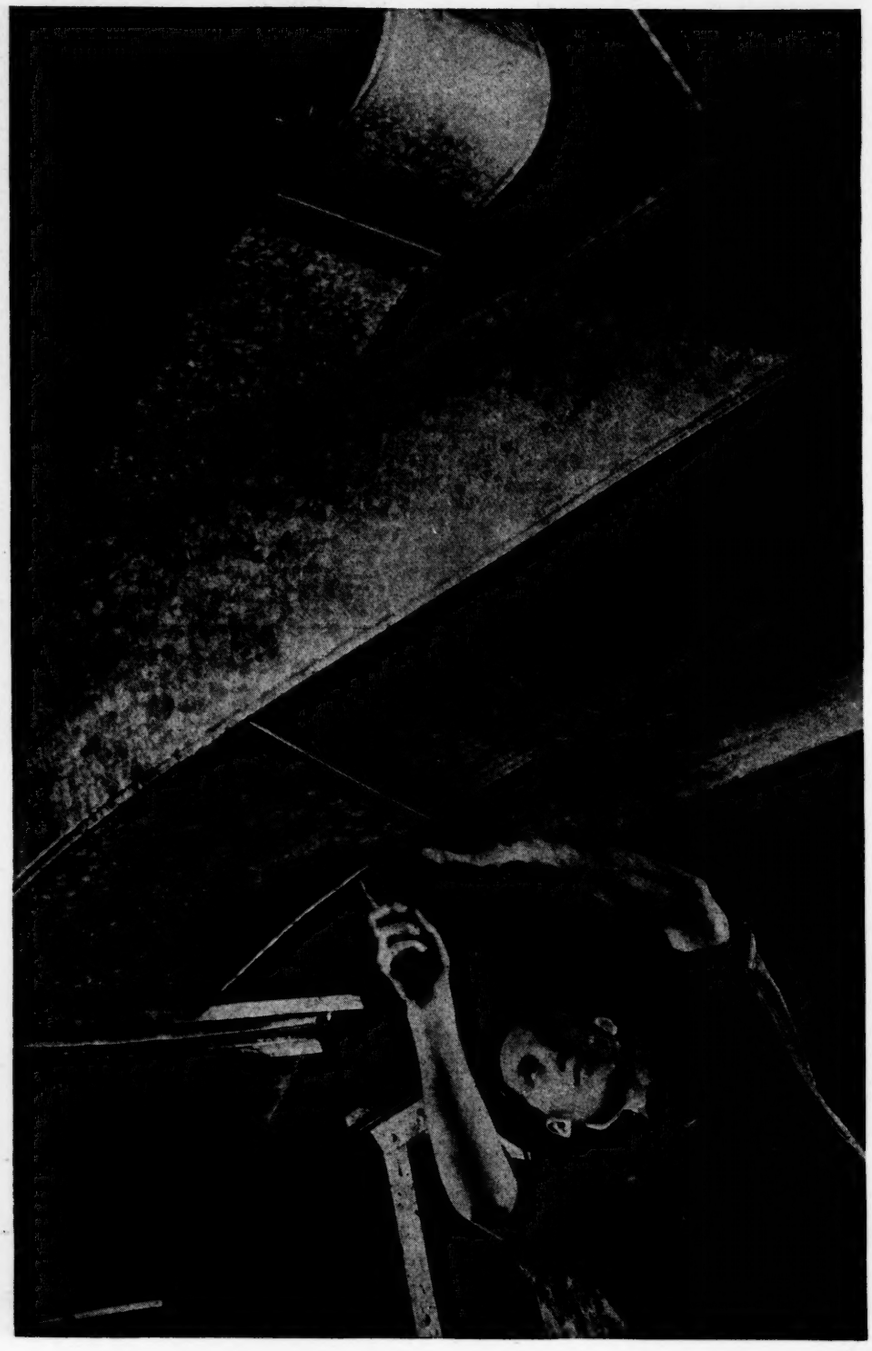
Many other features of Wagner motors are worth investigating. Write today for Bulletin 182 which describes the motors that are Second-To-None for air conditioning equipment.

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, U.S.A.

MOTORS • TRANSFORMERS • FANS • BRAKES

Your FIRST LINE OF DEFENSE...



U·S·S COPPER STEEL

WITH the great advances made in air-conditioning during the past few years, heating and ventilating engineers, architects and contractors have seized Copper-Steel as the material to use for durable ducts.

There are many good reasons why ducts should be made of USS Copper-Steel Galvanized Sheets. Quoting from the metallurgists who have studied steel sheets:

> **"Copper-Steel is an alloy of copper and steel, wherein a very small percentage of copper is advantageously used to impart its natural rust resistance to a very large quantity of steel. By the use of from 0.15 to 0.20 per cent of copper dissolved in molten steel, the life of unprotected steel may be said, conservatively to have been doubled; and this has been accomplished at an additional cost of less than 5 per cent."**

Every expert in heating and ventilating systems knows that corrosion is his worst enemy. Who can tell what amounts of water vapor, of industrial gases, of chemical fumes, of salty and brackish air may be contained in the air which passes through the ducts he builds?

USS Copper-Steel Galvanized Sheets are made to withstand these concentrated attacks of various types of corrosion. If you use USS Galvanized Sheets, preferably of USS Copper-Steel, you have the satisfaction of knowing that besides *durability*, these sheets represent *economy* and *lasting service* for your customers.

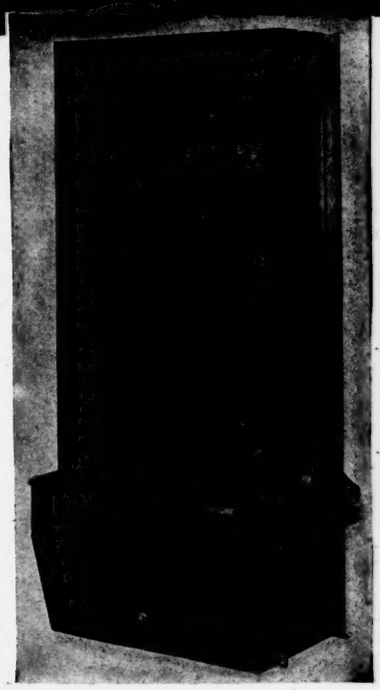
U·S·S GALVANIZED SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham, Alabama*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

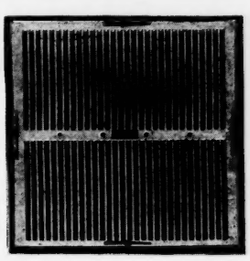
UNITED STATES STEEL

NEW FILTER By Staynew Filter Corp.



Here's the new Protectomotor Automatic Impingement type Air Filter that may solve a ventilation problem for you. Designed to handle large volumes of air with great economy, it is extremely effective for heavy dust concentrations. The principle is simple. Air passes through two intermittently revolving curtains—the first well impregnated with oil by running through an oil bath—the second effectually preventing particles of oil from being carried through to the clean air side of the filter. Write for the new Protectomotor catalog fully illustrating and describing this filter.

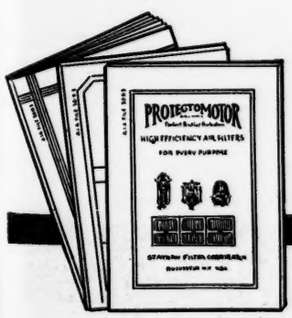
FOR POSITIVE DRY FILTRATION



Protectomotor Panel Filters feature Fin Construction and Feltex Filtering Medium. This latter is tough, long wearing, easily cleaned and as used in Protectomotors 99.9% efficient against ordinary sized dust particles. Protectomotor Panel Filters are 20" x 20" square. Any number may be bolted together to fit required spaces and capacities. New catalog gives applications and detailed description.

FOR DRY FILTRATION MAXIMUM ECONOMY LIGHT WEIGHT AND FLEXIBILITY...

Protectomotor Multi-V-Type filters feature Fin Construction plus a special dry cellulose base filtering medium of 98% efficiency against ordinary sized dust. Cells of patented fibre and metal construction can be quickly removed for cleaning if desired, or cleaned in the frames. Cells may be vacuum cleaned many times, then replaced at low cost. Full details of the many sizes and shapes of Multi-V-Type models in NEW CATALOG. Write for it today.

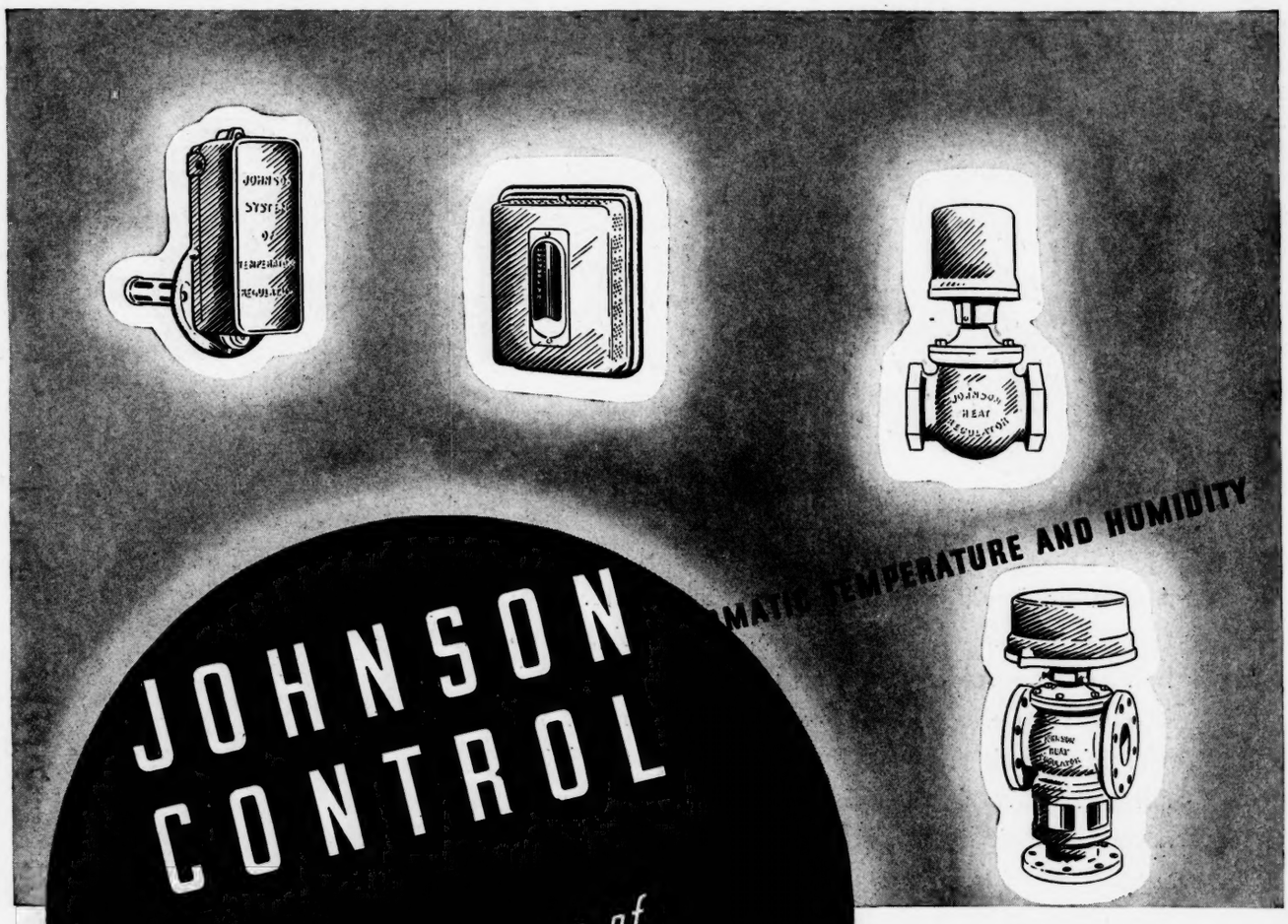


PROTECTOMOTOR
REG U S PAT OFF.
99 9/10 Per Cent EFFICIENT
AIR FILTERS

ALSO FILTERS FOR ENGINE INTAKE, AIR TRANSMISSION LINES, ETC.

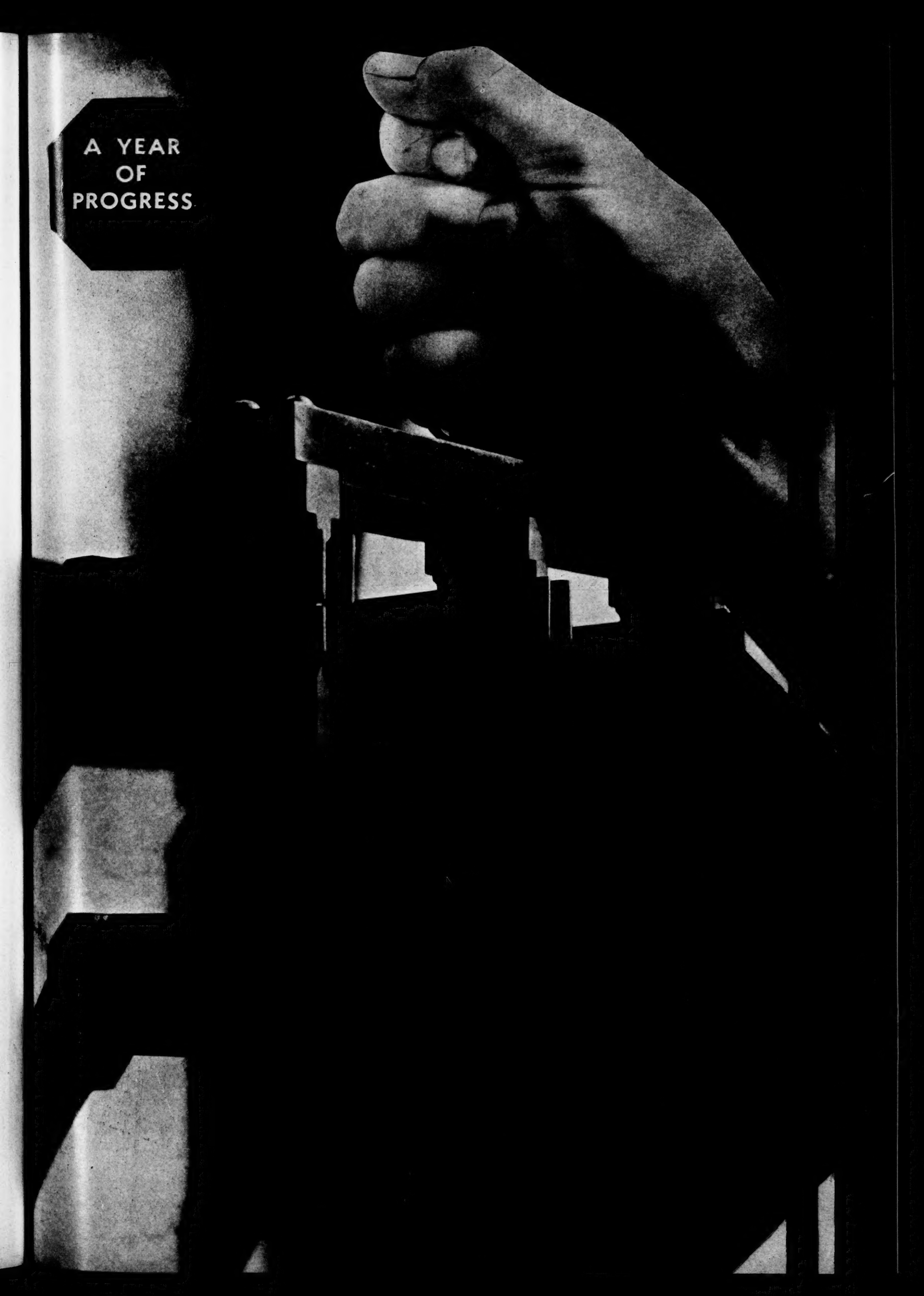
CLIP COUPON FOR CATALOG

Staynew Filter Corporation
15 Leighton Ave., Rochester, N.Y.
Send catalog (s) regarding Automatic Filter
( ) Panel type ( ) Multi-V-type ( ).
Name.....
Street.....
City.....State.....



JOHNSON has kept step with every development in the science of heating, cooling, ventilating and air conditioning for more than fifty years. Many of the hundreds of devices in the complete line of JOHNSON equipment have been designed and perfected in response to the demands of modern air conditioning practise. For the information of those interested in technical details, Apparatus Bulletins, illustrating and describing these devices, will be furnished on request. The Condensed Catalog is available to those interested in a general discussion of JOHNSON automatic Temperature and Humidity Control for all types of heating, cooling, ventilating, and air conditioning systems.

JOHNSON SERVICE COMPANY · MILWAUKEE, WIS. · OFFICES IN PRINCIPAL CITIES

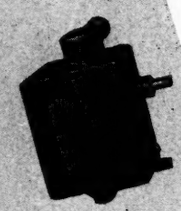

A YEAR
OF
PROGRESS

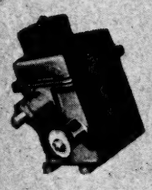
Electric

CONTROL SYSTEMS offer a higher degree of flexibility and adaptability than systems actuated by other mediums.

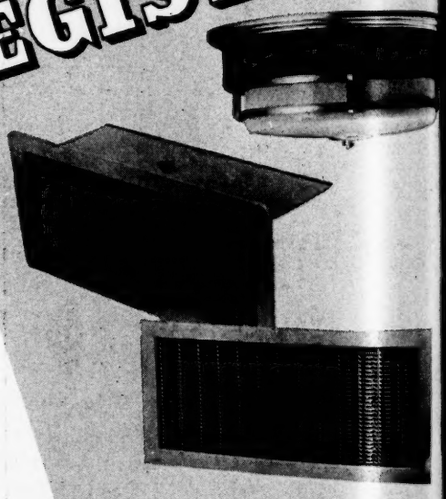
BARBER-COLMAN CONTROLS

Let's Look at the Future! Statistics and forecasts show a growing trend toward year-'round air conditioning. Automatic control equipment must be used on such installations, and on every automatic heating or cooling job as well. Proper selection of control equipment is an important task, requiring special knowledge. Our experience in providing control equipment for hundreds of recent installations has given us a broad acquaintance with the problems involved, and we are glad to place our knowledge at your disposal. The Barber-Colman Electric System is complete and comprehensive, with a wide variety of units of every necessary type. We are geared to meet the future!



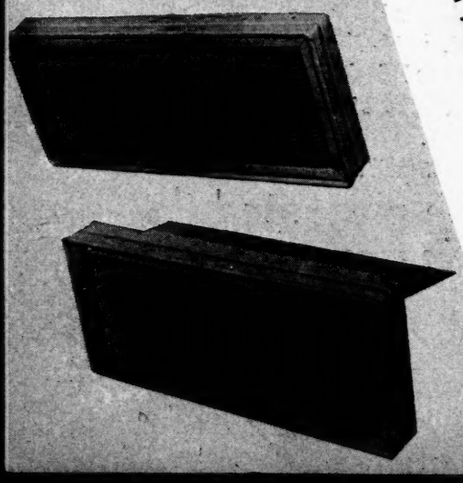


UNI-FLO GRILLES *and* REGISTERS



A few years ago engineers faced the problem of proper air distribution, which was rapidly becoming an important factor in air conditioning. As a result, the exclusive UNI-FLO diffusing and directional fin construction was developed. In thousands of outstanding installations, it has proved its merit. UNI-FLO Grilles and Registers offer a number of vital features not found in any other units designed for this service. Alert engineers are using UNI-FLO more and more because UNI-FLO produces the results they want. Write us for catalogs and further information.

FOR FURTHER INFORMATION SEE OUR CATALOG IN SWEET'S



BARBER-COLMAN COMPANY

ROCKFORD, ILLINOIS

U. S. A.

1936 Record-Breaking Year for Controls and Instruments

FEWER new controls and instruments made their appearance during 1936 than during any of the three or four previous years. The reason for this without doubt is that many of the manufacturers had completed their development work and brought out their products during the depression years when they were so extraordinarily active in development. Much of this activity was due to the increased importance of air conditioning and the resulting rush to develop suitable lines of equipment for use with it. By 1936 many of the makers had this situation well in hand at least from the equipment development angle. So also had most of them already given consideration to the control problems arising from the growing use of stokers.

Controls and instruments appearing during 1936 were largely those brought out to meet some particular need or to round out lines in the case of a few concerns. It is notable that several instruments appeared to measure sound levels and that means for measuring air velocities came in for renewed attention. These are both cases where there was a call for instruments developed to meet a specific purpose.

Combustion Equipment

Control of the operation of combustion equipment is now so generally practiced that the question has reduced itself largely to one of selecting suitable controls. Automatic control is certainly the trend in residential plants and in other plants to a degree depending almost entirely on the amount of superintendence necessary for other purposes rather than employed to watch fires or to supply them with fuel. Automatic devices for these purposes have so amply proved their reliability and their ability to conserve fuel that their presence is expected, and plant operation is confidently left in their charge. Even where fully automatic control is not applied combustion equipment now operates with at least semi-automatic devices. During 1936 there was no notable change in this trend which has been going on for some time. Combustion control equipment of the year reflected the growing importance of the automatic operation of stokers and controls for specific use with stokers continued to appear.

Instruments for measuring the completeness of combustion or for indicating or recording variations of combustion in heating plants have never been as generally applied as have automatic combustion controls. Progress in impressing engineers and owners of plants with the importance of such instruments as aids in operation has been slow. However, there is growing realization that setting of combustion equipment with the aid of instruments is both desirable and easy to accomplish. The trend is very much toward simple instruments, rugged but light enough for ready portability and intended to be readily placed or installed. As an example, equipment is now available whereby flue gas analysis can be quickly and easily made without the necessity of manipulating elaborate apparatus.

Refrigeration Control

Instruments and controls for refrigeration equipment are similar in function to those applied to combustion equipment. Here also the tendency is to make this equipment operate either entirely under automatic control or to reduce the human supervision to a minimum. Automatic expansion valves for controlling the flow of refrigerant to the evaporator continued to come to the fore. A new meter for measuring the flow of refrigerants is also notable. The range and variety of controls and measuring instruments now available for use with refrigeration equipment compare favorably with what is available for the combustion equipment. Application of refrigeration to air conditioning has been one of the most effective incentives toward developing automatic means of operation. Being newer to many in the field, the importance of automatic controls and the nature of the control equipment itself are not as well known as in the case of combustion controls. The summer equipment can no more get along and do its expected job without control then can the winter equipment.

Actuating Temperature and Methods

In winter especially, control of plant operation is now frequently being actuated from outside temperature. Equipment for outside application and means for correlation with inside temperature have received increased attention of late. Avoidance of too great differentials between inside and outside temperature and the change of the maintained inside temperature as the outside temperature and humidity change brought whole new classes of controls into being. More than that it brought an entirely changed viewpoint as to what should be expected of the operating controls. During the year equipment resulting from these ideas continued to appear.

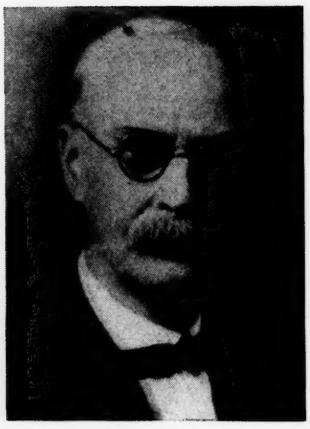
Recently use has been made of the electric currents set up when too dissimilar metals are joined in order to create power impulses and to actuate operating controls. This is the method used in measuring temperatures by thermocouples. The exceedingly small electric currents set up in the dissimilar metals are multiplied to secure enough power to throw switches or to position valves and dampers. While not new, this method of securing initial impulses may be looked on as a new development so far as the year's control equipment is concerned.

Automatic Change from Summer to Winter

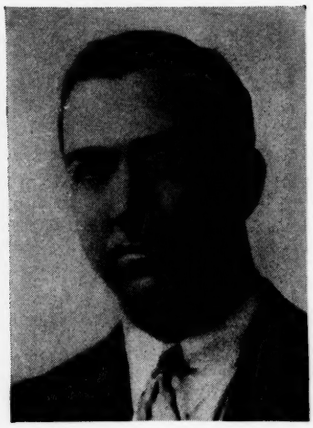
An interesting point in connection with the automatic operation of year-round plants is the necessity of providing automatic means of making the changeover between combustion equipment and cooling equipment. Many of the present installations require manual switching to accomplish this changeover. This is con-

John C. Cosgrove, President of Bituminous Coal Research Inc., Johnstown, Pa.

Thomas A. Lee, President, Lee Sheet Metal Works, Buffalo, N. Y.



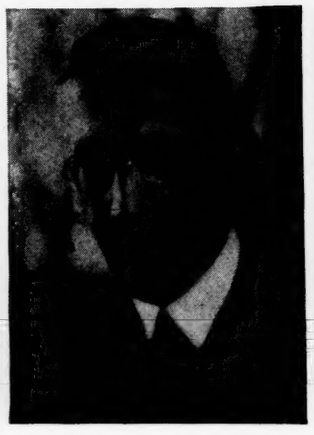
William Kyle Robertson, Consulting Engineer, Minneapolis, Minn.



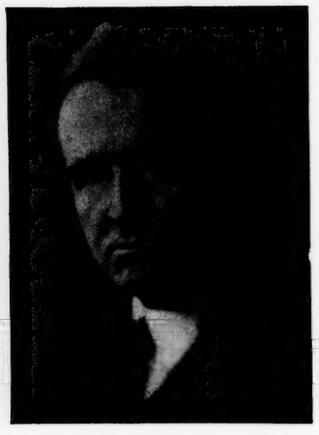
C. K. Lingo, Air Conditioning Engineer, Florida Power & Light Company, Miami.

Contributors to A Year of Progress

Harry M. Williams, Newly-Elected President, American Society of Refrigerating Engineers, Frigidaire Corporation, Dayton, Ohio.

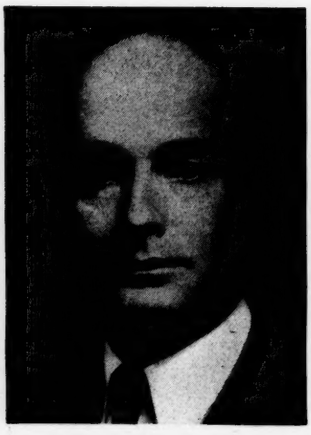


H. B. Meller, Managing Director, Air Hygiene Foundation, Mellon Institute of Industrial Research, Pittsburgh, Pa.

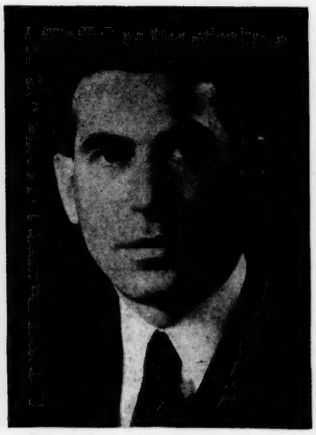


D. Robert Yarnall, Chairman, Research Committee of Engineering Foundation, Yarnall-Waring Co., Philadelphia, Pa.

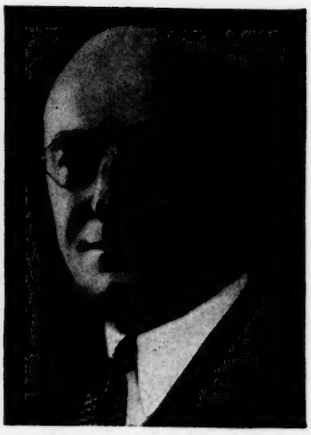
Melvin D. Engle, President, National District Heating Association, Edison Electric Illuminating Co. of Boston.



C. K. Michaels, Engineering Inspector, Bureau of Combustibles, New York Fire Department, New York, N. Y.



Julius Daniels, President, Air Conditioning Bureau of Boston, Edison Electric Illuminating Co. of Boston.



M. W. Link, Director of Division of Research and Development, Crane Company, Chicago, Ill.

ceded to be suitable where there is superintendence or where the changeover need be made but a few times yearly. It falls short of being fully automatic, however, and the manual feature becomes increasingly undesirable in those localities where there is continual shifting back and forth between winter operation and summer operation over a considerable part of the year. Progress in connection with this problem during 1936 was more toward better general understanding of its nature and importance than of anything which took place in the development of equipment for accomplishing it. Equipment and methods for this purpose are already in existence.

In spite of advances made recently in understanding and appreciating the function and importance of automatic controls in year-round plants, it is believed that the industry generally still does not fully comprehend the situation. So far as the winter side of the picture is concerned there is excellent understanding. Not only is knowledge of the function and importance of the equipment itself widely held but winter automatic control has now amply demonstrated its case. It is conceded to be safe, reliable, a boon to comfort and convenience, and moreover, its record in reducing fuel costs is impressive. Applied to summer equipment, automatic control has made its case commercially in produce and process work but has not made so much progress in comfort air conditioning. This field is relatively newer, less well understood, and savings in operation are not so readily demonstrated. What is needed is the same kind of persistent educational effort which has permitted automatic control to prove itself in other applications. During the year there were increasing indications that those most interested in promoting the use of controls for summer air conditioning are aware of the necessity of convincing users that automatic control for that purpose is worth while.

When it comes to the year-round plant there is still less for the applier to judge by. He does not understand the necessity of correlating the winter control with the summer control, far less does he usually realize exactly how it is done. The very complexity of the full control problem leaves him with the feeling that he is being expected to specify and install a lot of controls.

During the year leaders perceived this condition and made at least tentative moves to meet it. So far as known, however, there was no concerted movement. It was suggested that standards would accomplish the desired objective but no suitable standards are in existence, at least at the present time.

Development of suitable automatic controls undoubtedly made the extended application of oil burners, gas burners, and stokers possible. In just the same way the control feature is certain to play an important part in making possible the widespread use of year-round air conditioning. The position is reversed, however, for now the control equipment is available and the problem is to obtain an understanding of how essential its use is in securing the full benefits of air conditioning. The control makers face an educational problem here but they have already made a start in its solution.

Methods of Marketing

No innovations in selling methods were reported during 1936. Manufacturers continued to sell, install, and service their equipment on the basis of plans now well established. Interesting and novel selling campaigns were frequent but were based on established marketing practices.

Statistical Position

No reliable statistics are available whereby estimates of sales of controls or instruments can be established. There is no doubt, however, but that sales of this equipment increased over 1935 in at least as great a proportion as the volume of new building increased. Some idea of the increase can be secured by noting curves on earlier pages of this issue. It is believed, however, that the increase is even faster than any of these curves show for the use of controls and instruments generally is growing so fast that they would be expected to exceed average curves. Moreover, prospects for the increasing use of this equipment are unusually bright. There is every reason to expect that during 1937 they will continue to find their market expanding faster than the average for other equipment types.

Record of New Equipment

Brief descriptions of the nature and function of many of the new controls and instruments which appeared during 1936 are presented in the next few pages. The list speaks for itself and individual items are not held up for particular mention here. These devices are so essential to the design and operation of every plant that no one who depends on applying equipment in the whole field of heating, ventilating, or air conditioning can fail to be interested in the year's record, presented all in one place and without the presence of other equipment descriptions to divert attention.

1936 Progress in Controls and Instruments

Penn Day-Nite Control

NAME AND MODEL NUMBER—Penn types 770 Tem Clock and 860 Day-Nite Imperial Temtrol.

PURPOSE — Electric switch clocks for full automatic control of set-back temperature.

FEATURES—Tem Clock operates on 25 volts and controls set-back temperatures, day or night, as desired, through low voltage electrical connection to the Temtrol. This permits the former to be mounted on the wall at eye level, with the Temtrol mounted in the 4-ft. zone. Both the time for automatic starting of periods of set-back temperature and the time for ending of such periods may be set easily. A knob built into the front cover of the clock indicates whether high or low temperature is being maintained. When manually set for high temperature, the clock will automatically begin timed day-nite control at the beginning of the next low temperature period for which it is set; when manually set for low temperature, the clock will return to fully automatic control at the beginning of the next high temperature period. Set-back temperatures are obtained by action of a small resistance heater, built into the Temtrol through a low voltage circuit closed by the switching mechanism of the clock. Set-back of night temperatures is obtained through electrical action.

MADE BY — *Penn Electric Switch Co., Des Moines, Iowa.*

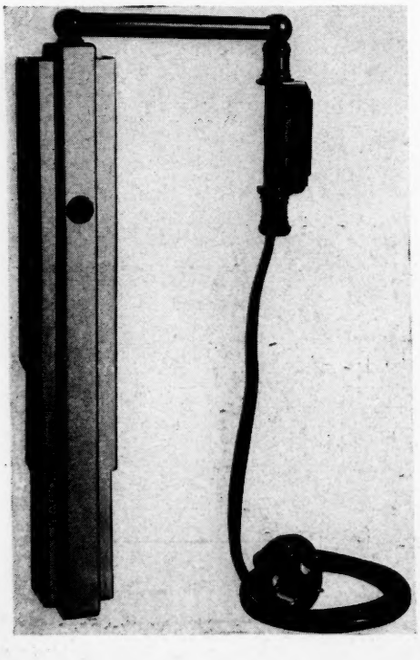
Friez Windowstat

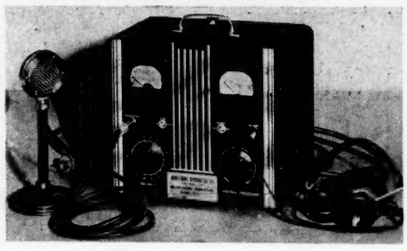
NAME—Windowstat.

PURPOSE—To control excessive condensation on windows during cold weather.

FEATURES—Consists of humidity sensitive instrument in close proximity to the window and at a point where the sensitive element detects a too high moisture condition at that point. When this is reached the device through its electrical contacts overrules the wall humidistat and shuts down the humidifier until such time as further humidity can be added without condensation occurring. Can also be used in connection with a fan, in the case of display windows, to blow warm air over the window and increase the temperature and consequently the capacity of the window to carry condensation without moisture.

MADE BY—*Julien P. Friez & Sons, Inc., Baltimore, Md.*





Model 300 Sound Level Indicator

NAME AND MODEL NUMBER—Model 300 sound level indicator.

PURPOSE — For measuring intensity and character of sounds as heard by the ear.

FEATURES—Consists of a calibrated crystal type microphone, audio-frequency amplifier, calibrated attenuator, ear weighing filter, calibrated output or decibel meter, and crystal type headset. The attenuator is used to place the instrument within the wide range of sound encountered as the decibel meter is limited in its range to 16 decibels. The ear weighing filter is used so that the decibel meter will respond to sounds as they are actually heard by the human ear as the human ear is not equally sensitive to all frequencies of sound nor to all changes in intensities. The decibel meter is an output meter of the rectifier-milliammeter type. The device has a reference level of 10^{-16} watts. The frequency used as a basis of calibration is 1,000 cycles per second. This practice conforms to the proposed standards of the A.S.A.

SIZES AND CAPACITIES — Has a range from 20 to 102 decibels.

MADE BY—*Industrial Apparatus Co.*, 720 *North Wabash Ave., Chicago.*

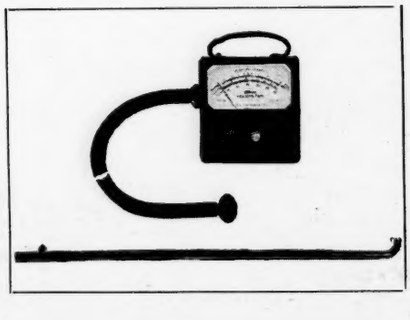
Attachments for Alnor Velometer

MODEL NUMBERS—Nos. 2460 and 2485.

PURPOSE—Attachments to increase the usefulness of the Alnor Boyle system velometer. Type 2460 is used to obtain direct readings of static pressure in ducts, plenum chambers. and pipes in inches of water. Type 2485 is used for obtaining direct readings of total pressure in inches of water.

FEATURES—Type 2460 can be used for either positive static readings with a jet, tube, and fittings attached to the left side of the velometer or for suction or negative readings with the jet, tube, and fittings attached to the right side of the instrument. Type 2485 is for insertion in an air duct or chamber with the opening of the jet pointed directly into the air stream. A small guide fin on the jet at the tube end aids in assuring that the opening of the end is in line with the air stream and facing into the air stream.

MADE BY—*Illinois Testing Laboratories*, 420 *N. LaSalle St., Chicago.*



Bausch & Lomb Dust Counter

NAME—Bausch & Lomb dust counter.

PURPOSE—An instrument for measuring the dust concentration in air.

FEATURES—Dust counter combines in one unit both the air sampling device and a dark field microscope viewing and counting system. The air sampling mechanism consists of a moistening chamber through which the air is drawn by means of a calibrated hand pump of 1/1,000 cu. ft. capacity and an impinging device which deposits the dust particles suspended in the air on a circular glass plate within the instrument. Twelve samples may be collected on one slide and these samples may be viewed and counted without removal. They may be preserved by sealing a cover glass to the slide. The viewing and counting apparatus consists of a built-in compound microscope of 200X magnification.

MADE BY—*Bausch & Lomb Optical Co., Rochester, N. Y.*

Mercoid Stokatherm

NAME AND MODEL NUMBER — Mercoid Stokatherm, type JMV.

PURPOSE—For controlling the operation of coal stokers.

FEATURES—According to the manufacturers, the Stokatherm performs four distinct functions: (1) fire maintaining; (2) out-fire operation; (3) limits overheating; (4) increased fuel savings. The transformer relay is in principle a low voltage transformer but also operates as a repulsion relay. The manufacturer states that rattling noises due to uneven, dirty or rusty armature faces, cannot occur as the transformer does not employ a clapper type iron armature. The timer is actuated by a self-starting synchronous motor with heavy cut brass wheels having pinions of tool steel. The temperature actuated mechanism responds to changes in stack temperature and by means of a mechanical interlock controls the starting of a timer interval period. After the given time period has elapsed with no operation of the stoker, the control automatically puts the stoker into operation to maintain the fire. The temperature actuated mechanism operates on a temperature differential. Mercoid mercury contact switches are used throughout.

LITERATURE AVAILABLE—Bulletin 242-A.

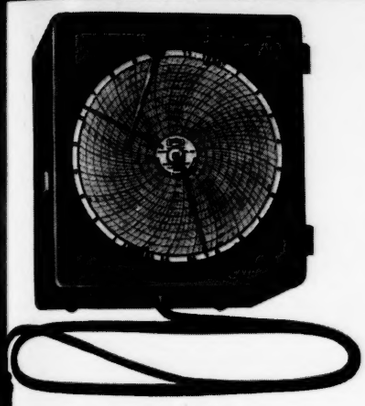
MADE BY—*The Mercoid Corp.*, 4201 *Belmont Ave., Chicago, Ill.*

MOTOCO

INDUSTRIAL THERMOMETERS

for

Dependable Temperature Indication



MODEL "500"
MOTOCO RECORDING
THERMOMETER
LIST PRICE
$31.00

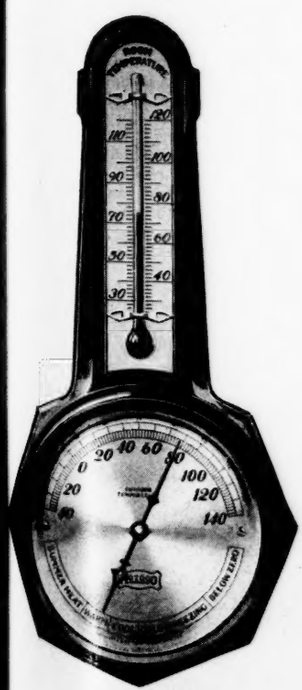
- Motoco precision instruments have a wide variety of application on all equipment requiring accurate and dependable temperature indication.

- Cold storage rooms, brine lines, heating and ventilating equipment, meat and food cooking processes, laundry wash wheels, dough mixers, transformers, ovens, Deisel engine water, bearing and exhaust temperature, etc. are just a few of the applications on which Motoco instruments have found a ready acceptance.

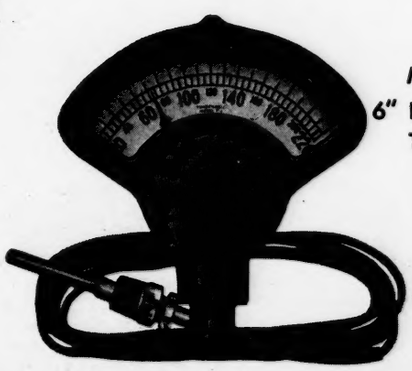
- All Motoco instruments are custom made. They employ the exclusive Motoco "Solid Liquid Filled" one to one ratio movement. All hair springs, gears, pinions and other delicate parts have been eliminated, resulting in a movement that is not affected by vibration. The Motoco will render satisfactory service over a long period of time under the most severe operating conditions.

- In addition to precision thermometers, the Motoco line includes pressure and vacuum gauges, oxy-acetylene gauges and recording gauges.

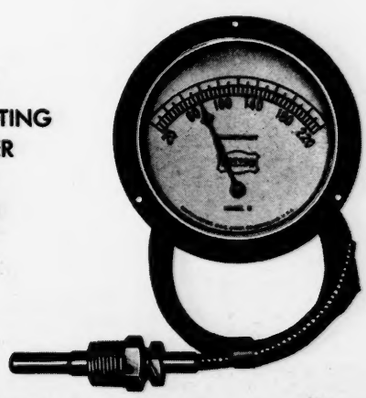
A post card or letter will bring you complete details, together with our recommendation for your application.



MODEL "KM"
INDOOR & OUTDOOR
THERMOMETER
12' Capillary Tubing
For Home or Office
LIST PRICE
$12.00



MODEL "F-1"
6" DIAL INDICATING
THERMOMETER
LIST PRICE
$20.00



MODEL "G"
3½" DIAL INDICATING
THERMOMETER
LIST PRICE
$16.75

THE ELECTRIC AUTO-LITE COMPANY

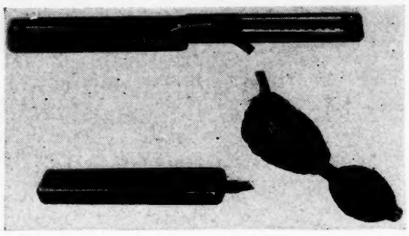
MOTO METER GAUGE & EQUIPMENT DIV.

CHRYSLER BUILDING · NEW YORK CITY, N. Y.

Friez Hand-Aspirated Psychrometer

NAME—Hand-aspirated psychrometer.

PURPOSE—For measuring relative humidity in cramped quarters or for locations where use



of a sling psychrometer is inconvenient or undesirable.

FEATURES—Wet and dry bulbs are aspirated by induced air which is drawn across the bulbs at a high velocity. The hand pump forces air through a venturi tube which draws secondary air from the outside across the wet and dry bulbs. The cover of the small chamber in which these bulbs are enclosed may be opened to facilitate applying water to the wet bulb, and also forms a thermo shield for the bulbs. The thermometers are secured to the hinged lid and the case of the instrument serves as a handle when in use. When not in use, the thermometers are protected inside the metal case.

DETAILS OF OPERATION—Use of instrument is simple, and satisfactory results can be obtained by a person unskilled in the art of using a sling psychrometer. The doubt as to whether a sling psychrometer has been whirled long enough or too long is eliminated. The operator operates the hand bulb pump and watches the thermometers until the correct condition is reached.

MADE BY—*Julien P. Friez & Sons, Inc., Baltimore, Md.*

Taylor Binoc Tubing

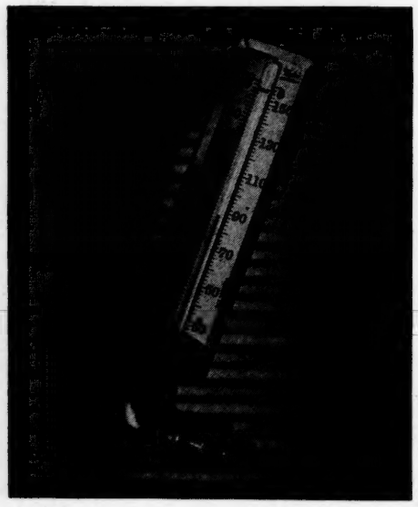
NAME—Taylor Binoc tubing.

PURPOSE—A new glass tubing for industrial thermometers to improve their readability.

FEATURES—More than twice the accustomed angle of vision combined with high magnification of the mercury column. Triple lens construction which is said to gather three times as much light as in the ordinary tubing and concentrates it behind the mercury column, making the column stand out in sharp relief.

AVAILABLE ON—All popular straight angle and handled forms of thermometers.

MADE BY—*Taylor Instrument Companies, Rochester, N. Y.*



Aminco Anemometer

NAME—Aminco TardiGrade Anemometer.

PURPOSE—For measuring velocity of air current as low as 6 f.p.m.

FEATURES—Consists of an anemometer element which is placed in the duct or at the position where the velocity of air is to be measured and of an indicating instrument which can be located in any convenient spot. Indicating instrument can be used with a number of elements so as to show the velocity at a number of different points. It is said that a measurement can be made in a few seconds and that inexperienced persons can be taught to use the device in a few minutes. The manufacturer states that the instrument can be used at any temperatures between the lowest refrigeration temperature and 300F, and that the maximum error when operating at either extreme is less than 2% of the calibration readings.

PRICE—Complete instrument, $190; extra anemometer elements $40, f.o.b.

MADE BY—*American Instrument Co., Inc., 8010-20 Georgia Ave., Silver Spring, Md.*

Little Giant Tork Clock

NAME—Little Giant Tork clock.

PURPOSE—Daily automatic control of electrical circuits.

FEATURES—Clock operates without winding or regulating and may be set on various schedules without use of tools. The device is made of non-corrosive materials including brass, stainless steel, and moulded bakelite. Fast moving gears run in a sealed oil chamber. The 24-hr. day is divided into four sections, of 6 hr. each, covering morning, afternoon, evening, and night. The device has 5,000 watts capacity for either single or double pole service.

MADE BY—*The Tork Clock Co., Inc., Mt. Vernon, N. Y.*

Square D Pressure Regulator

NAME AND MODEL NUMBER—Pressure or vacuum regulator, Class 9100.

PURPOSE—Pressure or vacuum regulator for automatic pressure control of electric refrigerators, automatically-fired steam boilers, air compressors, water and vacuum pumps.

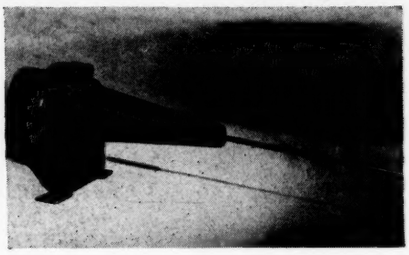
FEATURES—These regulators have a pressure limit of 500 lb., a vacuum limit of 30 in., a pressure differential of from ½ to 60 lb., and a vacuum differential of from 2 to 20 in. This company has also introduced an overload protection for Class 9100 regulators. The overload protection can be built into the regulators or purchased separately.

MADE BY—*Square D Co., Regulator Div., 6060 Rivard St., Detroit, Mich.*

Brown Instrument Protectoglo

NAME—Protectoglo.

PURPOSE—Safety control for combustion safeguarding.



FEATURES—Electrode of heat resistant conducting material projects into the firebox so that flame impinges upon the electrode. Operation depends on electrical conductivity of the flame itself. Relays contain the thermionic tubes for rectification and amplification of the power input which, when conducted from the electrode unit to ground through the flame, operate the relay units controlling the operation sequence, main fuel valve, etc. Any interruption in the circuit to ground through the flame (flame failure) causes shut-down.

MADE BY—*The Brown Instrument Co., Philadelphia, Pa.*

Hays Orsatomat

NAME—Hays Orsatomat.

PURPOSE—An automatic instrument for analyzing flue gases.

FEATURES—This instrument is an automatic orsat device which can analyze a sample of flue gas within twenty seconds by simply turning a lever. The results are given by a pointer on a scale. The entire action is said to be automatic. The Orsatomat consists of a rotatable analyzing body which contains the measuring and absorption chambers and is charged with mercury and an absorbing chemical; a metallic bellows and linkage for moving the pointer; an aspirator bulb and the necessary rubber tubing, and a pressed steel case of special non-tipping design fitted with a carrying handle. On the model illustrated, a pointer draft gage is included and space is provided for a flue gas thermometer.

TYPES AVAILABLE—Standard model for analyzing CO_2, twin unit model for analyzing both CO_2 and O_2. Models with special scales for testing automobile exhaust gases.

MADE BY—*The Hays Corporation, Michigan City, Ind.*

ALWAYS IMPROVING

Always improving products and so improving business, that's the slogan that wins in any line. To fill up gaps, to set new standards, to supply new types of controls and tools for the heating and ventilating engineer, is an ideal realized in every Friez product. It sets the Friez organization apart among those who are supplying instruments and controls. Just observe a little and you will find that the Friez company has attained this unique position, that it has no competitors, and yet has an increasing supply of business. Glance at the instruments illustrated here. Not one of them is made by any other manufacturer. They are original, exclusive with Friez, and each one solves a needy problem that has arisen since the nestling Air Conditioning, a few years back, began to try its wings.

HAND ASPIRATED PSYCHROMETER

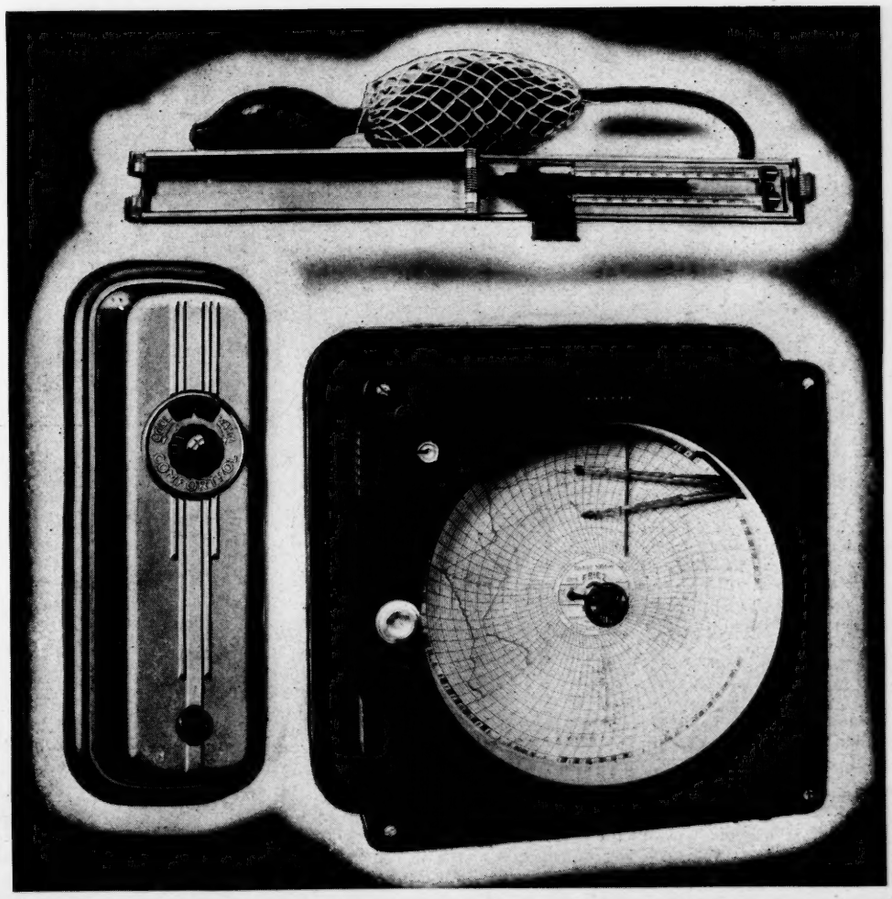
Make humidity readings with a pocket size instrument you do not whirl. New standard Psychrometer by which you see so easily and so reliably actual humidity readings. You read it as easily as you read the time on your watch.

COMFORTROL

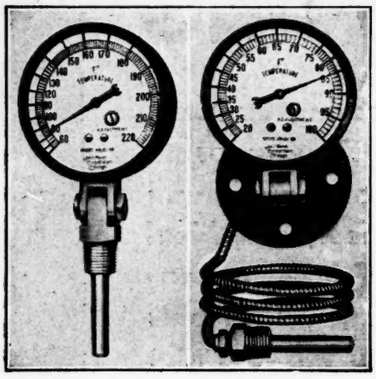
New type of thermostat, that is self-compensating for Humidity changes. It takes account of both heat and humidity and controls to Air-conditioning's ideal ... EFFECTIVE TEMPERATURE. . . . It is the Human Comfort control.

TEMPERATURE-HUMIDITY RECORDER

For the installation in a large building or plant, where an executive wants to read in his office the actual air-conditions being maintained. It writes temperature and humidity of any remote location. Humidity, remember, is recorded directly in percent relative humidity. It gives one complete answer of Air-conditions. It is original and exclusive.



FRIEZ BALTIMORE **FRIEZ of BALTIMORE** FRIEZ BALTIMORE



Marsh thermometers, types 61 and 62

Marsh Thermometers

NAME AND MODEL NUMBER—Universal socket dial thermometers, types 61 and 62.

FEATURES—Type 61 fitted with the Universal socket permits the use of the one instrument as a vertical connection thermometer, a 90° back angle thermometer, a front angle thermometer, or any intermediate angle. It eliminates the requirement of specifying a specific type of stem for each particular application. Type 62 distant reading thermometer is standard with 6 ft. of connecting tubing and a union bulb or, in the case of high temperature thermometers, either a union bulb or a flexible plain bulb. Has a mounting flange together with the universal socket which permits installation of instrument proper at any convenient point on top or in front of the apparatus or on a wall or pillar and then to install the bulb right at the point of temperature. Manufactured in 3½-in. dial size only and standard with black crystal finish all over, black crystal finish with nickel-plated trim, polished brass finish all over, or nickel-plated finish all over.

SIZES AND CAPACITIES—Complete assortment of Fahrenheit scale ranges for all requirements from 20° below zero up to 800° or corresponding Centigrade scales.

MADE BY—*Jas. P. Marsh Corp., Chicago.*

Prest-O-Lite Halide Leak Detector

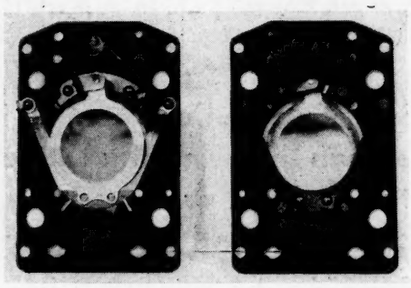
NAME—Prest-O-Lite Halide leak detector.

PURPOSE — For detecting refrigerant leaks, especially where odorless, tasteless, and colorless refrigerants are used.

FEATURES — Insurance companies prohibit testing for leaks of a combustible gas with any flame. The Halide leak detector consists of a needle valve torch handle assembly, a burner which includes a suction nipple for attaching a rubber hose, and a chimney with a copper reaction plate. The rapid flow of acetylene through the burner causes a suction which draws in any refrigerant gas near the open end of the suction tube.

DETAILS OF OPERATION—To operate the detector, the flame is first adjusted so that the top of the outside cone is level with or slightly above the chimney of the detector. The open end of the suction tube is used to explore around those places where a leak might occur. Any halide refrigerant gas drawn into the burner is decomposed with the formation of free acids. These acids, coming into contact with the hot copper reaction plate, cause instant color response in the flame. Visible color indication of the smallest concentration of refrigerant gas by a green-tinted flame is given by the detector. When a large amount is present, the flame assumes an intense violet color. After the source of the leak has been passed, the flame clears almost instantly. The two-color variation of flame gives visible indication of the amount of refrigerant gas present.

MADE BY — *The Linde Air Products Co., New York.*



Leland Thermal Release Switch

NAME—Leland thermal release switch.

PURPOSE—To prevent burning out of motors when the starting current becomes too heavy or when the motor develops an over-heated condition.

FEATURES—Device is so designed that it must be set by hand. This is done so that if the device trips frequently the trouble will be called to the attention of a serviceman. The manufacturer states that it should be noted that the device is not an overload protection but an overheat protection. It is the purpose of the switch to keep the motor on the line at any load possible for the motor regardless of its relation to the normal rating as long as no permanent damage is done to the parts by heat.

MADE BY—*The Leland Electric Co., Dayton, Ohio.*

Friez Effectistat

NAME—Effectistat.

PURPOSE—In connection with a thermostat to maintain a constant effective temperature regardless of the var ation in relative humidity.

FEATURES—Device is essentially a thermostat with a variable po:nt of dry bulb control to suit the relative humidity existing at the moment. If the humid'ty rises the dry bulb control is automatically lowered in the correct ratio to maintain the effective temperature unchanged; if the relative humidity falls, the point of dry bulb is automatically set to maintain the correct ratio unchanged. Instrument consists of a bimetallic temperature element and multiple human hair sensitive humidity element.

MADE BY—*Julien P. Friez & Sons, Inc., Baltimore, Md.*

Synchron Control

NAME—Synchron control unit.

PURPOSE—Time control unit for oil or gas burners for reducing length of off periods.

FEATURES—Device is set to feed fuel at the rate of 30 sec. to 5 min. out of every quarter-hour, depending on the size of the heating plant. Manufacturer claims that use of this control increases baseboard temperature 4° without increasing the 70° temperature at the breathing line. Operates independent of room thermostat and can be cut in during cold weather and cut out in milder weather. It can be installed with any make temperature control system, two or three wire, line voltage, or low voltage. Cams operate make and break system. Contact point made of tungsten.

SIZES AND CAPACITIES — Furnished in heavy steel box, 6½ x 4½ x 3½ in.

MADE BY—*Industrial Engineering Corp., Evansville, Ind.*

Powers Temperature Controllers

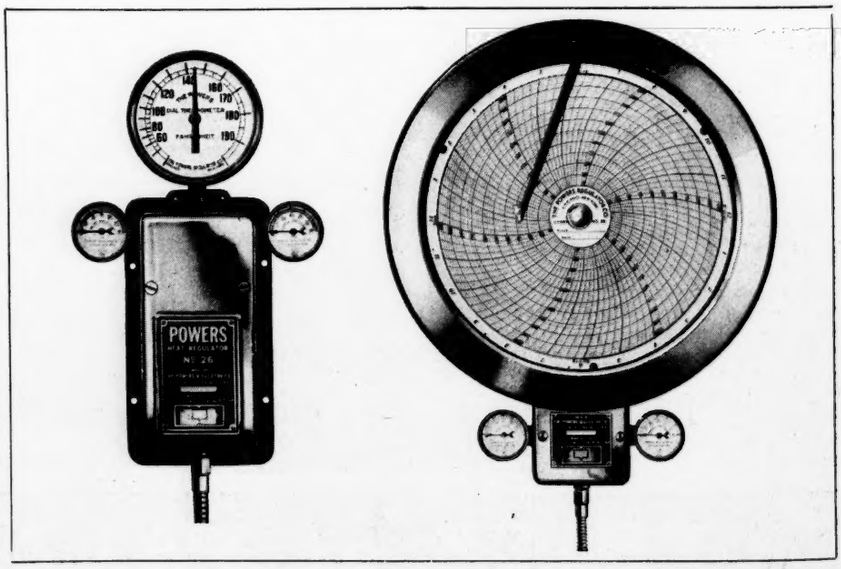
NAME—Powers air operated temperature controllers.

PURPOSE—For controlling temperatures.

FEATURES—There are three types of remote bulb, remote valve, air operated temperature controllers available. The essential portion of all three is the No. 26 heat regulator which, when supplied without indicator or recorder, constitutes one of the three new control devices, the second being the No. 26 with indicator, and the third being the No. 26 with recorder.

What is said to be a unique feature of the No. 26 is that, although it employs a vapor pressure thermal system highly sensitive to temperature changes at the bulb, the setting dial has uniform temperature graduations, as have also the recorder charts. The dial thermometer in the illustration is of 4 in. diameter; in the No. 26 with recorder the recorder is a 12½-in. instrument with 10-in. chart having a 3 9/16-in. scale. Both direct and reverse acting regulators are available together with a variety of diaphragm motor valves and damper motors, the valves, too, being available in direct acting, reverse acting, and three-way types. Bulbs of seven different designs (including wet bulb) can be furnished, with thermal systems for any of the following temperature ranges: 0-100F, 50-150F, 100-200F, or 150-250F.

MADE BY—*Powers Regulator Co., Chicago, Ill.*



Powers No. 26 heat regulator. (Left) with indicator, (Right) with recorder.

KEEPING PACE!

AMERICAN industry refuses to stand still. Unless a manufacturer advances, he quickly falls by the wayside. Rarely is there a middle ground.

We believe that our reputation for keeping pace with the needs of Chace customers is why we are a leading supplier of Thermostatic Bimetal to American industry. Among the users of Chace Thermostatic Bimetal are the nation's foremost manufacturers of automobiles, electric appliances, refrigerators, hot water heaters, gas and oil burning furnaces, circuit breakers, temperature control devices, and numerous other products where automatic action must take place with changes in temperature, or where temperature must be controlled.

These manufacturers set a fast moving pace. They are continually introducing new and improved products. This means that Chace engineers and metallurgists must be ready to supply bimetal element having physical properties and dimensional characteristics especially suited to these new products.

Our modern manufacturing facilities are ready to serve you promptly—with Chace precision Bimetals.

W. M. CHACE COMPANY, 1606 BEARD AVENUE, DETROIT, MICHIGAN

Heat treating furnaces (*below*) used to stabilize the physical properties and operating characteristics of Chace Thermostatic Bimetal. The temperatures of these furnaces are automatically controlled by the most modern equipment. This is one of the various operations insuring the high standard of accuracy and uniformity for which Chace Thermostatic Bimetal is noted.

Chace maintains an active research department for the study and investigation of new alloys and their applicability to bimetal production. The control panel (*below*) regulates the operation of induction furnaces, dilatometer, thermocouple checking furnace and other special laboratory equipment used in experimental work in the Chace research department.

H-B Aspirating Psychrometer

NAME—H-B aspirating psychrometer.

PURPOSE—To indicate the amount of humidity in the air.

FEATURES — The manufacturer states that accurate readings can be obtained in one minute. Psychrometer can be obtained in either of two portable types; one a self-contained battery type, and the other a plug-in type operating on 110 volts, a.c. Both models employ the aspirating principle of drawing air at the proper velocity by a motor-driven fan across the sensitive mercury bulbs of two thermometers which are suspended in the air stream. The thermometers are calibrated in single degrees and are placed near the end of the intake sleeve, the incoming air passing first over the dry bulb and then over the wet bulb. A table for computing relative humidity and pocket slide rule for determining direct reading relative humidity are furnished with each instrument.

MADE BY—*H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.*

Bristol Controller

NAME AND MODEL NUMBER—Model 90 controller.

PURPOSE—Automatic pressure and temperature controller.

FEATURES—Equipped with a wide range sensitivity adjuster. Can be changed from direct to reverse acting, or vice versa, by the user without additional parts. Case is moisture-, fume-, and dust-proof.

MADE BY—*The Bristol Co., Waterbury, Conn.*

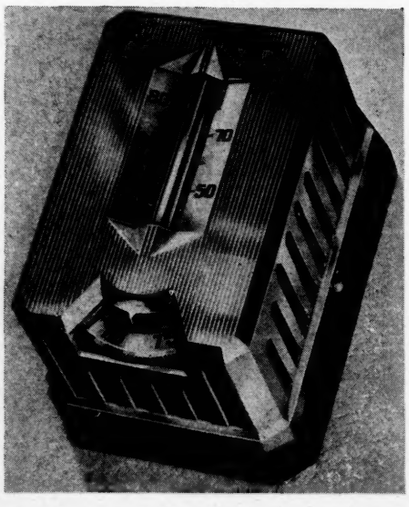
Spencer Thermostat

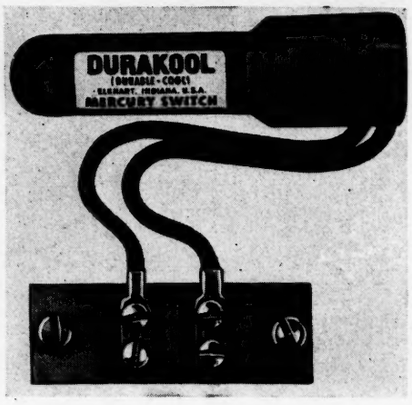
NAME—Room thermostat.

FEATURES—Concealed contacts to provide for protection from dust. Has dead front with no live parts exposed in thermostat. Available in three types, standard, heat accelerator, and an outside compensated cooling control unit. Available with regular room mounting or with mounting accessories for special outlet box, conduit connection, wall plate for over-the-surface mounting, and standard switch box with plain or switch plate. Switch plate is a transfer switch for changing thermostat from winter heating to summer cooling control or reverse. Klixon disc thermostatic elements used. Available in five finishes: gold, chrome, brown lacquer, walnut bakelite, and ivory plaskon.

SIZES AND CAPACITIES—For 250 volt service, 125 volt service, and 30 volt or less.

MADE BY—*Spencer Thermostat Co., Attleboro, Mass.*





Durakool Mercury Switches

NAME—Durakool mercury switches.

PURPOSE—A mercury switch for breaking and completing circuits in control and indicating apparatus.

FEATURES—The manufacturer states that this type of mercury switch opens and closes at exactly specified angles and that these angles will not only remain the same throughout the life of the unit but are also independent of the load. The switch is encased in a metallic envelope which is surrounded by molded bakelite insulation.

LITERATURE AVAILABLE—Bulletins Nos. 100 and 300.

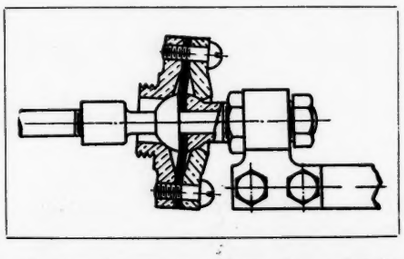
MADE BY—*Durakool, Inc., 1010 N. Main St., Elkhart, Ind.*

Davis Float Box Construction

NAME—Packless float box construction.

PURPOSE—Available on all of the company's float boxes for valve, switch, signal, or indicating purposes.

FEATURES—Designed primarily for oil and chemical industries where highly volatile fluids are handled. It also offers protection against leakage and maintenance nuisance wherever water or other liquids are stored under pressure. Elimination of conventional packing is accomplished by a flexible diaphragm, a ball joint construction which forms



a fixed seal. Pressure thrust is carried by ball joint, the outboard side of which is lubricated with long-life graphite grease.

MADE BY—*Davis Regulator Co., Chicago.*

Supreme-Friez Humidity Control

NAME—Supreme-Friez humidity control.

PURPOSE—A simplified humidity control, consisting of a Supreme solenoid water valve mounted on a Friez insertion humidistat.

FEATURES—Device is made up of a Friez insertion humidistat which uses a human hair element to indicate changes in relative humidity. The solenoid water valve is built up with a cast iron case and has a terminal chamber for conduit and BX connections. The valve is especially designed for humidity application.

MANUFACTURED AND ASSEMBLED BY—*Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.*

Link-Belt Radiostat Control

NAME AND MODEL NUMBER—Link-Belt Radiostat Control.

PURPOSE—An electronic controlled device known as the radiostat control which is used to regulate the operation of stokers from the outside air temperature.

FEATURES — A heat sensitive element is placed on the outside north wall of the building while a boiler unit is submerged just below the water level in the boiler and a return line element is placed on a condensate line coming from the part of the building where it is most desirable to control the temperature. Lines lead from these three devices to a master control installed on the wall of the basement. It is said that the electronic tubes of the control device are sensitive to changes of as little as 1F and once the device is installed and adjusted, it needs no further attention regardless of weather conditions. The only moving part in the Radiostat is a motor starting relay. Manufacturers claim a saving of approximately 15% in the use of steam above the boiler room.

MADE BY—*Link-Belt Co., Stoker Division, 2410 W. 18 St., Chicago, Ill.*

G-E Thermostat Control Wire

NAME—G-E thermostat control wire.

FEATURES—The wire incorporates exclusive Deltabeston design features and non-combustible insulating materials. Purified asbestos, applied by a special process, is used to insulate the flexible copper conductors. A rustproof cadmium plated armor is wound around the asbestos-insulated conductors to provide protection for the wire while in service.

MADE BY—*General Electric Co., Bridgeport, Conn.*

Bacharach Draft Gage

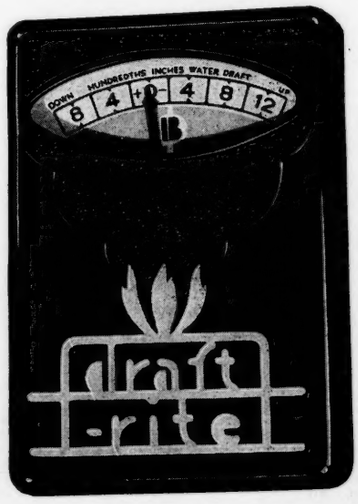
NAME—Draftrite vestpocket draft gage.

PURPOSE — For measuring draft intensity ranging from 0.14 in. up-draft to 0.10 in. down-draft.

FEATURES—Designed for hand operation and manufacturer claims that readings can be obtained practically instantly. The instrument indicates draft intensity to 1/100 in. of water. Illustration is full size. Instrument weighs less than 3 oz.

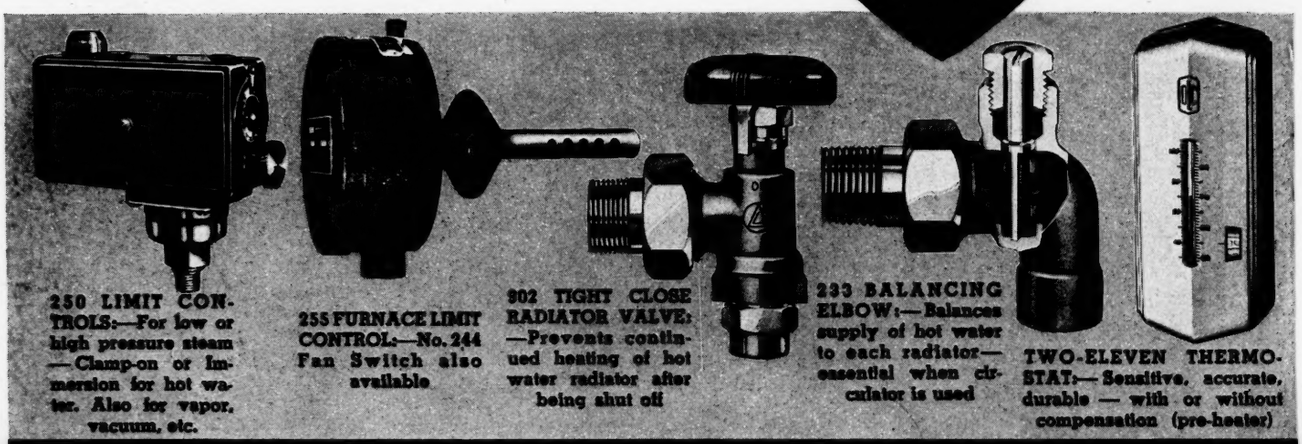
METHOD OF OPERATION—One end of the draft tube is inserted in the hole at the top of the gage while the other end is placed in the flue pipe. A finger is then placed over a hole at the bottom of the gage and the gas is leveled so that the pointer reads zero. When the finger is removed, the pointer indicates the draft intensity.

MADE BY—*Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh.*



REGARDLESS of the size or type of automatic heating, ventilating or air conditioning system you install, there is a Minneapolis-Honeywell automatic control system for it. Each control system is selected to exactly meet the individual requirements of the installation. Be sure you include complete automatic Minneapolis-Honeywell controls on every job. They are your assurance that the system will function at its best, with the greatest efficiency, economy and trouble free performance. The Minneapolis-Honeywell Engineer in or near your city is available for consultation at all times. Call him in. Minneapolis-Honeywell Regulator Company, 2715 Fourth Avenue South, Minneapolis, Minnesota . . . Branch and distributing offices located in all principal cities.

DEPENDABLE CONTROL IS THE VERY *heart* OF AIR CONDITIONING



250 LIMIT CONTROLS:—For low or high pressure steam—Clamp-on or Immersion for hot water. Also for vapor, vacuum, etc.

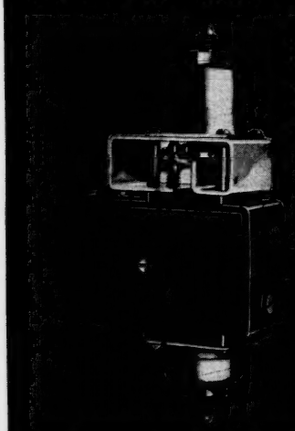
255 FURNACE LIMIT CONTROL:—No. 244 Fan Switch also available

902 TIGHT CLOSE RADIATOR VALVE:—Prevents continued heating of hot water radiator after being shut off

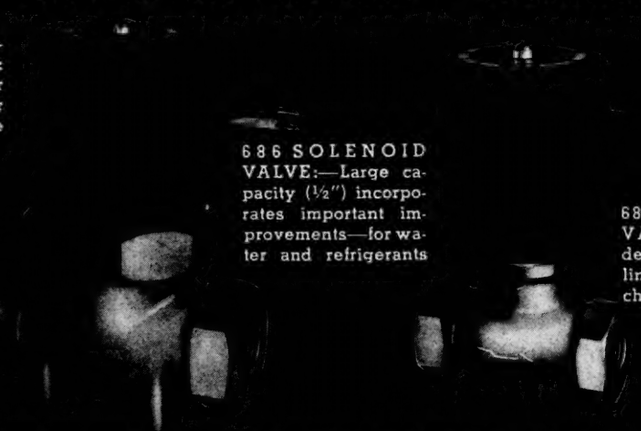
233 BALANCING ELBOW:—Balances supply of hot water to each radiator—essential when circulator is used

TWO-ELEVEN THERMOSTAT:—Sensitive, accurate, durable — with or without compensation (pre-heater)

GRAVITY OIL BURNER ACCESSORIES • POWER OIL BURNER ACCESSORIES • REFRIGERATION EQUIPMENT



250 REFRIGERATION CONTROLS:—For pressure or temperature, with or without high side cut-out



686 SOLENOID VALVE:—Large capacity (½") incorporates important improvements—for water and refrigerants

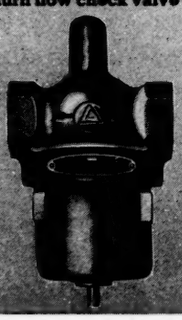
683 R3 SOLENOID VALVE:—Specially designed for controlling flow of methyl chloride, sulphur dioxide or Freon

AIR CONDITIONING CONTROLS • STOKER CONTROLS • GAS BURNER CONTROLS • ROOM THERMOSTATS

(At Left) CRC 270 PRESSURE REGULATING VALVE:—Serves dual purpose of regulating fuel pressure at nozzle and preventing flow during "off" periods

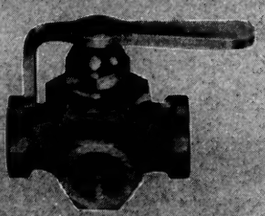
(At Right) CRC 238 SAFETY FLOAT VALVE:—Manual and automatic—complete fuel control for gravity burners

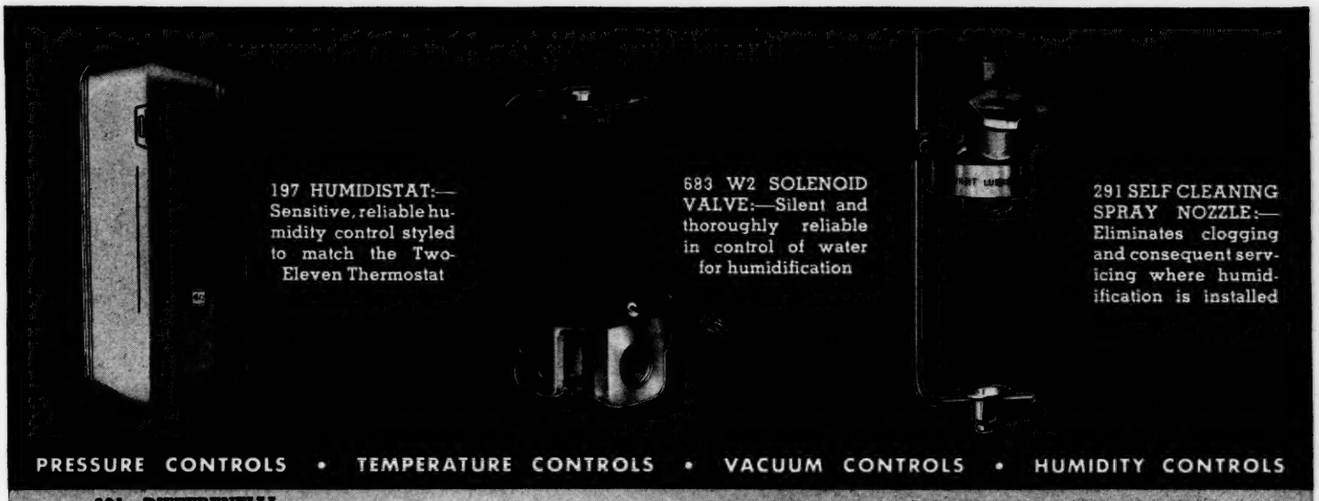
CRC 100 ANTI-SYPHON VALVE:—In one unit, an anti-syphon valve and return flow check valve



CRC 425 FUEL STORAGE GAUGE:—Reliable, inexpensive unit for inside tanks. Gauges for buried tanks also available

CRC 520 THREE WAY VALVE:—Eliminates need for separate shut-off valves on twin tank installations





197 HUMIDISTAT:—Sensitive, reliable humidity control styled to match the Two-Eleven Thermostat

683 W2 SOLENOID VALVE:—Silent and thoroughly reliable in control of water for humidification

291 SELF CLEANING SPRAY NOZZLE:—Eliminates clogging and consequent servicing where humidification is installed

PRESSURE CONTROLS • TEMPERATURE CONTROLS • VACUUM CONTROLS • HUMIDITY CONTROLS

691 DIFFERENTIAL THERMOSTAT:—For Summer cooling, controls by the DIFFERENCE between indoor and outdoor temperature according to ASHVE Comfort Curve

431 MOTOR UNIT:—For Zone Control. Provides inexpensive means for individual control in zoned heating

384 STOKER TIMER:—Control with relay-transformer as illustrated. Supplied also with hand safety switch and as timer only

298 RELAY TRANSFORMER:—Small compact combination of relay and transformer which operates silently

LOW WATER CUTOUTS • TRANSFORMERS • RELAYS • HEATING CONTROLS • REFRIGERATING CONTROLS

673 THERMOSTATIC EXPANSION VALVE—Scientifically designed to keep evaporators completely refrigerated. Also 674 non-adjustable valve

785 THERMOSTATIC EXPANSION VALVE—Large capacity for air conditioning—capacity up to 20 tons on Freon. Smaller sizes 10 tons and 6 tons

782 STRAINER:—Designed for use with large thermostatic valves or solenoids—bolts directly to valve flanges

AVAILABLE AT LEADING JOBBERS THROUGHOUT THE COUNTRY

DETROIT LUBRICATOR COMPANY

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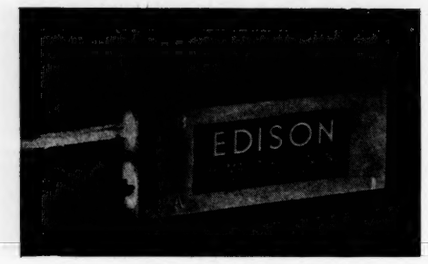


Edison Time Delay Relay

NAME AND MODEL NUMBER — Edison "Sealed Protection" Time Delay device.

PURPOSE—An adjustable time delay relay for use with heating devices to remove from the circuit an accelerating heat-up unit as the device attains its operating temperature.

METHOD OF OPERATION—A small external resistor on the timing relay enables the operator to adjust it to give time delay periods in the order of 10 to 15 minutes. In principle, the relay operates as a thermal inertia device depending for its period upon the time required to heat the block to a predetermined temperature.

SIZES AND CAPACITIES—Will handle 800 watts at voltages up to 230, AC or DC.

MADE BY—*Thomas A. Edison, Inc., West Orange, New Jersey.*

Barber-Colman Microtherm

NAME—Barber-Colman Microtherm.

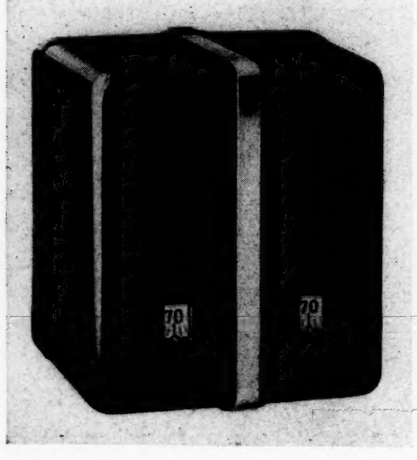
PURPOSE—An electrical thermostat for the control of modulating valves and damper control motors.

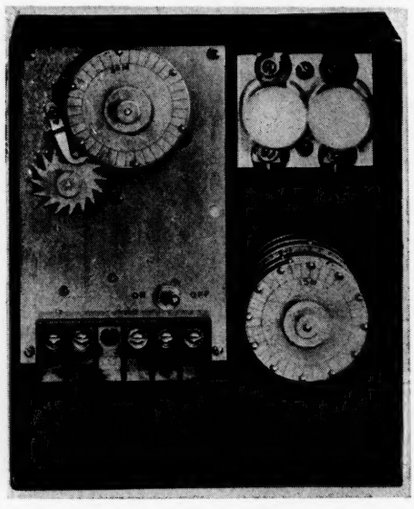
FEATURES—The Microtherm is composed of a flat bimetal temperature-sensitive element, a multiplying spring, a small solenoid, and two contact points. It is designed for use with either the Microvalve, which is a throttling valve, or the Microtrol which is a modulating type damper control motor.

The flat bimetal element moves up and down between the two contact points, moving upward with a falling temperature and down with a rising temperature. Attached to this movable element is a small armature which is arranged to move within a solenoid coil. When the solenoid is energized, it tends to pull the bimetallic strip down so that it touches the lower contact. This then causes the motor on the control valve or damper to start and shut off the supply of heat. The electrical current which energizes the solenoid comes from a potentiometer in the valve or damper housing. This potentiometer is connected to the motor in such a manner that the current to the solenoid is proportional to the amount that the valve or damper is opened. Therefore, as the amount of heat supplied to the heating system is increased, the current in the solenoid is simultaneously increased. This in turn makes it harder for the bimetallic strip to bend upwards and touch the contact which causes the motor to supply additional heat.

METHOD OF OPERATION—Suppose the Microvalve to be in control of the heat supply to a room in which the Microtherm is placed; suppose, also, the valve is half open; then the potentiometer arm will be in the center of the potentiometer windings and the pull of the solenoid is just sufficient to hold the bimetallic element between the contact points when the temperature is at 70F. If the temperature drops slightly, the bimetallic element will bend upward touching the upper contact. This will run the Microvalve in the direction to increase the heat supply and the potentiometer arm in the direction to increase the current in the solenoid until the resulting pull is sufficient to again position the bimetallic element between its contacts. Again, if the temperature increases slightly, the lower contact will be closed and the Microvalve will run in the direction to decrease the heat supplied and the pull of the solenoid until the bimetallic element again rests between its contacts. Thus, for each temperature of the element, there corresponds a position of the Microvalve.

MADE BY—*Barber-Colman Co., Rockford, Ill.*





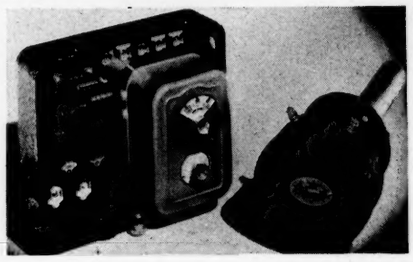
Paragon Periodic Firing Control

NAME AND MODEL NUMBER — Periodic firing control, model LSF.

PURPOSE—For regulating oil burners and stokers so that there is a delay between the cutoff and restart of the stoker or burner to level off the difference between the relatively rapid drop in boiler pressure or temperature as compared to the slower drop in room temperature.

DETAILS OF OPERATION—In the morning firing proceeds in usual way until desired room temperature is produced. During firing periods, periodic control is automatically disconnected from existing circuits. When desired boiler pressure is reached, pressure control stops stoker or burner in usual way. Opening of motor starter which stops burner or stoker immediately sets periodic firing control in operation. This control opens line through the normal restart position on pressure control and prevents heating unit from starting until set time delay has elapsed, at which time periodic control reestablishes the starting line, heating unit starts in usual way, and periodic control stops, resets, and is ready for next period. A double pilot light gives a visible figure through a glass bull's-eye in the case during the operating period.

MADE BY—*Paragon Electric Co., Chicago, Ill.*



Iron Fireman Pyrometric Control

NAME—Iron Fireman pyrometric control.

PURPOSE—To meter coal to the fire on the basis of both time and temperature.

FEATURES—The control is said to make the most of the stable fuel bed characteristic of a coal fire to keep the heating plant warm and conditioned for use, to provide positive assurance that the coal burner will not continue operating if fire becomes extinguished. Unique indicator dial tells which one of four reasons is responsible for operation or idleness of burner. Available only on Iron Fireman automatic coal burners.

MADE BY—*Iron Fireman Manufacturing Co., 3170 W. 106th St., Portland, Oreg.*

Spencer Limit Control

NAME—Thermostatic control for bonnet, fan, and duct service.

FEATURES—Available in a low cost unit with a voltage range up to 250 volts. Has adjustable range and adjustable differential. Swivel mounting bracket. Is mounted with element in plenum chamber.

MADE BY—*Spencer Thermostat Co., Attleboro, Mass.*

Bristol Recorders and Controllers

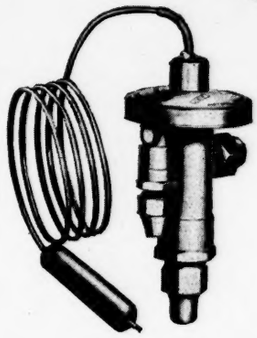
NAME AND MODEL NUMBER — Bristol low-range model D40M.

PURPOSE — For recording and controlling drafts or pressures in minimum ranges of 0 to 0.2 in. of water and maximum ranges of 0 to 2.0 in. of water.

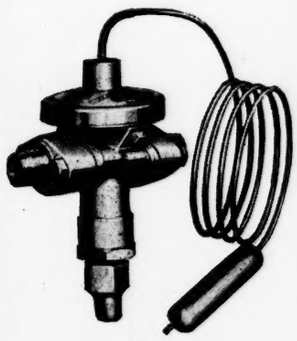
FEATURES—The control instruments operate on the basic Free Vane principle of pneumatic control used extensively on other items made by this company. Equipped with a sensitivity adjustment for synchronizing throttling range with process lag.

MADE BY—*The Bristol Co., Waterbury, Conn.*

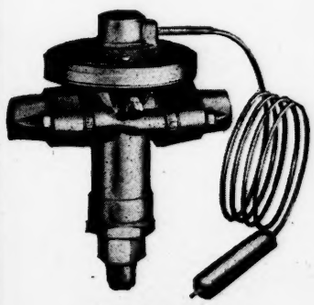
REFRIGERANT CONTROLS *that defy leakage*



MODEL 210



MODEL 215



MODEL 220-K

In the field of modern refrigeration and air conditioning applications, Ⓐ Refrigerant Controls stand out unmistakably as the logical choice of those who recognize the value of uninterrupted performance.

Leakproof safety and trouble-free service are outstanding factors in the overwhelming preference which is swinging to Ⓐ Controls. Through every stage of its production, from the forged brass body to the completed assembly, every Ⓐ valve must pass the scrutiny of a battery of fault-finders before it is permitted to carry its serial number.

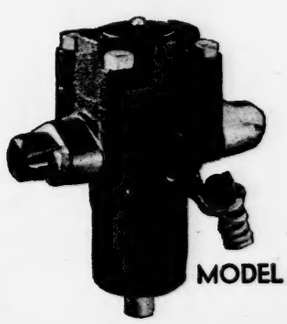
Ⓐ Thermostatic Expansion Valves are now available in a complete range of sizes up to 15 tons Freon capacity.

Address inquiries to our new location
2462 N. 32nd Street

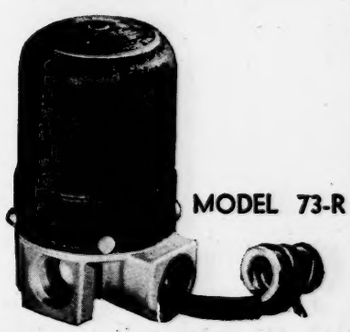
AUTOMATIC PRODUCTS COMPANY
MILWAUKEE WISCONSIN

PROGRESSIVE JOBBERS EVERYWHERE STOCK Ⓐ CONTROLS

MODEL 70-N



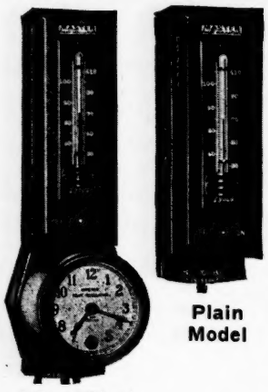
MODEL 78



MODEL 73-R

WELL BUILT
FOR LASTING EFFICIENCY

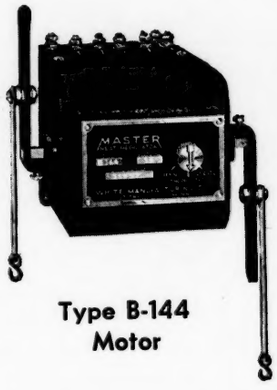
Whether you are a contractor, jobber, or engineering executive, you get the best and save the most with MASTER PRODUCTS. Sturdily constructed of finest materials—built by experts—backed by over twenty years of growing success in the heat regulator field. Master builds in accuracy and long life, and offers these instruments at the lowest possible price for which such quality and service can be purchased.



8-Day Clock Model — Plain Model

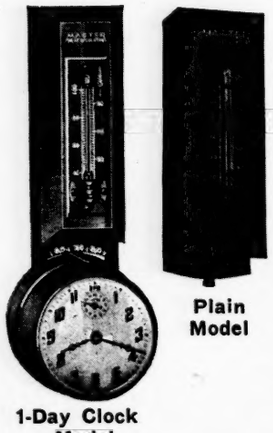
Type B-144
Gradual Operation

For precision, performance and long-time dependability this is THE instrument in the entire field of automatic heat control. It has four-position smoothness together with the unequalled sensitiveness of Master's patented Thermo-Wafer. Contacts are platinum-iridium. Special non-inductive thermal starting switch requires less than 3 watts. The four-pole induction motor operates at 16 volts through a special low-reactance type of transformer. Listed as Standard by Underwriters' Laboratories.



Type B-144 Motor

B-144 List Prices: 8-Day Clock Model (Complete).....$62.00. Plain Model (Complete).....$40.00



1-Day Clock Model — Plain Model

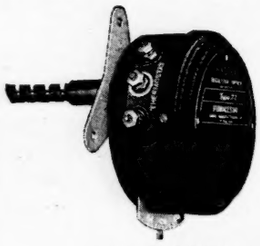
Type B-22
Standard

A MASTER instrument with the appearance, accuracy and reliability characteristic of the entire line. Priced for the greatest market of all—moderate salaried home owners. Has fine silver contacts, and 1 degree temperature range response. Motor is quiet with ample power to lift any damper. Furnished with attached or separate transformer. Listed as Standard by Underwriters' Laboratories. Also furnished in eight-day clock model.

Type B-22

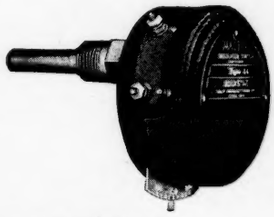
B-22 List Prices: 1-day Clock Model (Complete).....$32.00. Plain Model (Complete).....$22.50

Limit Controls



Type 22 Furnacestat
List Price $10.00

Type 22 Aquastat
List Price $12.00

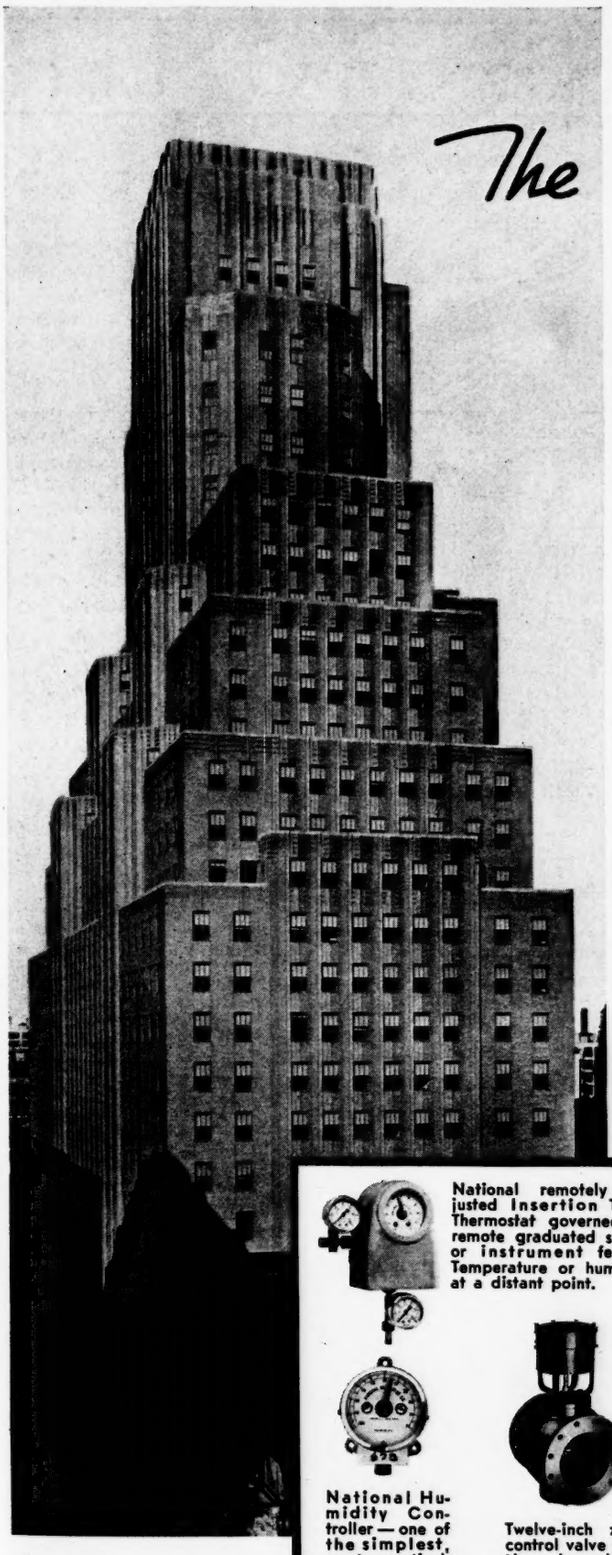


In addition to standard line, we furnish quotations on regulators for special applications.

MASTER HEAT REGULATOR

DEPENDABILITY BUILT IN BY MASTER CRAFTSMEN

THE WHITE MANUFACTURING CO., 2364 University Ave., Saint Paul, Minn.



Brooklyn Telephone Building. Other Telephone buildings with National Control in this vicinity are two Bell Telephone buildings at 50th Street and 18th Street, three New Jersey Bell Telephone buildings and the Whippany Plant of the Bell Telephone Laboratories.

National remotely adjusted Insertion Type Thermostat governed by remote graduated switch or instrument feeling Temperature or humidity at a distant point.

National Humidity Controller — one of the simplest, most practical, most economical instrument ever developed.

Twelve-inch zone control valve with the dependable metaphram actuating unit.

The COMMON-SENSE *approach*

"IF YOU find a thing difficult," said a great craftsman, "your approach is too complicated" . . . . and that reasoning has guided the development of National Regulator equipment for thirty-five years. During those years National Regulator Company has created for itself a sharply defined position in temperature control expressed in the direct, common-sense approach to control problems.

National Regulator thermostats and humidifier controls are simple, strong, powerful, direct-acting units. The actuating units — metaphram-operated valves and dampers — are simple, strong devices, powered by the most certain and easily controlled medium—compressed air. In planning even the most elaborate system, the question asked by National Regulator engineers is: "Will it work right under all conditions; is it practical, easy to understand, easy to maintain, easy to operate?"

And the smooth, efficient, economical, unfailing performance of the hundreds of National Regulator installations is the reward of strict adherence to this sane, common-sense angle of approach. Those who should know best—the men who operate National-equipped buildings—know the full significance of this, and your investigation of the record of National Regulator Systems will be your final reason for installing and specifying the apparatus that stands squarely on its record of promises fulfilled and results delivered.

ASK FOR THE NEW BOOKLET

outlining the modern developments in National Regulator Controls and defining the National Regulator policy in controlling all phases of heating, cooling, ventilating and air conditioning.

NATIONAL REGULATOR COMPANY
2309 Knox Avenue **Chicago, Illinois**

NATIONAL REGULATOR CONTROL

of HEATING, COOLING METAPHRAM VENTILATING, HUMIDIFYING

NEWS OF THE MONTH

Porter States Success of Oil Burner Show at Philadelphia Assured; ACMA to Cooperate with OBI

NEW YORK—Organization of the National Oil Burning and Air Conditioning Exposition to be held in Philadelphia March 15-19 has progressed rapidly. Even at this early date success is assured, according to G. Harvey Porter, managing director of Oil Burner Institute and of the exposition committee. Displays will feature the newest oil burner, distillate, and air conditioning equipment produced by leading manufacturers for domestic, commercial, and industrial application. Fuel oil companies and accessory manufacturers will also show.

Up to mid-December commitments had been signed by 40 manufacturers for 106 spaces representing 56% of the available booths. Contacts are being made with members for space allotments as fast as possible according to the customary rotation. A number of firms that have not yet had an opportunity to inspect the official layout have wired tentative reservations to C. F. Curtin, exposition manager.

The Institute announces that steps will be taken at Philadelphia to prevent unapproved displays of equipment in hotel rooms which is said in the past to have caused considerable annoyance and embarrassment.

Recent formation of a joint committee on cooperation headed by J. J. Donovan, General Electric Co., indicates that for the first time the Air Conditioning Manufacturers Association is officially participating in the program with the Oil Burner Institute, sponsor of the show. Other members of this committee are W. B. Henderson, executive vice-president of the ACMA; J. R. Hertzler, York Ice Machinery Corp.; Milton Powers, Timken-Silent Automatic Div.; Frank Dewey, Gar Wood Industries; and G. Harvey Porter. Close ties between the memberships of these two bodies have long existed. With the building upswing and consequent increase in interest in domestic air conditioning, much of which is oil actuated, leaders of each industry believe that there is much to be gained through cooperation of the type planned.

Among other favorable indications of trade interest in the forthcoming show is the return to membership in the Oil Burner Institute of several former members, among them Century Engineering Co., Cedar Rapids, Ia. Other similar applicants await only official action by the Board before they too will be eligible to show their latest products at Philadelphia.

Re-establishment of an Oil Burner Institute membership division for accessory manufacturers, after a four-year lapse, has eliminated the haphazard requirements under which such exhibitors formerly participated.

Although still in the formative stage, the convention program is said to be the most complete to be offered in the 14-year history of the show. A thorough study has been made of previous activities with a view of strengthening certain sections. Sessions will be arranged for each technical division of the trade and no effort spared to make them authentic, informative and generally worthwhile.

Radio broadcasts have been tentatively arranged for the purpose of providing authentic up-to-date information to the public on modern oil heat and air conditioning practices. These are in connection with speaking schedules arranged for the public at Convention Hall, adjacent to the exposition.

This is the third time in 14 years that the industry has chosen Philadelphia as the show site. It is one of the industry's finest markets, with 53% of the families owning their own homes. It has splendid sales and service representation. Thus leaders in the industry believe the show will serve as a springboard to a most productive year.

New Duties for Tennant

PITTSBURGH—R. J. J. Tennant, formerly supervisor of commercial steam and electric sales for the Duquesne Light Co., has resigned to accept a position with the Pittsburgh Business Properties, Inc. Mr. Tennant started with the Duquesne Light Co. in 1924 as an apprentice engineer, serving in the capacity of draftsman and salesman before being placed in charge of steam and electric sales. His new connection includes both engineering and sales duties.

1936 H & V INDEX READY SOON

The annual index for the 12 issues of HEATING & VENTILATING for 1936 is being prepared and will be mailed on request to any subscriber without cost. Address Circulation Department, HEATING & VENTILATING, 148 Lafayette St., New York, N. Y.

ASHVE to Hold 43rd Annual Meeting in St. Louis

ST. LOUIS—The 43rd annual meeting of the American Society of Heating and Ventilating Engineers will be held here January 25-27, at the Hotel Statler. A conference of delegates from the 21 chapters will be opened by President Larson at 10 a.m. the first day (Monday). The first technical session will be called to order at 2 p.m. Monday, while the annual banquet will be held Tuesday evening with E. B. Langenberg acting as toastmaster and an address by Dr. A. C. Willard, president of the University of Illinois. A feature of the meeting will be an inspection trip of the Anheuser Busch power plant and brewery.

The technical program follows:

MONDAY, JANUARY 25

Thermal Properties of Concrete Construction, F. B. Rowley, A. B. Algren, and Robert Lander.

The Specific Characteristics of Fans, M. C. Smart and J. B. Lusk.

TUESDAY, JANUARY 26

A.M.

A Rational Method of Duct Design, L. G. Miller.

The Noise Characteristics of Air Supply Outlets, D. J. Stewart and G. F. Drake.

Noise in Ventilating Systems and Methods for its Elimination, J. S. Parkinson.

P.M.

Investigations on the Exchanges of Energy Between the Body and Its Environment, Dr. Charles Sheard and Dr. M. M. D. Williams.

Fever Therapy Induced by Conditioned Air, F. C. Houghten, Dr. M. B. Ferderber, and Carl Gutberlet.

Cooling Requirements for Summer Comfort Air Conditioning, F. C. Houghten, F. E. Giesecke, Cyril Tasker, and Carl Gutberlet.

Report of ASHVE—ASRE Committee on National Standards for Air Conditioning Applications, L. A. Harding.

WEDNESDAY, JANUARY 27

Heat Losses and Efficiencies of Fuels in Residential Heating, R. A. Sherman and R. C. Cross.

Performance of Oil-Fired Warm-Air Furnaces in the Research Residence, A. P. Kratz and S. Konzo.

Condensate and Air Removal Rates in a Vacuum Heating System, D. W. Nelson.

Bartlett Winner in Arco Contest

NEW YORK—Ralph I. Bartlett, a heating and plumbing contractor on the island of Nantucket, last month won a trip to Europe for himself and Mrs. Bartlett by giving the best reason for selling the American Radiator Company's air conditioner to provide air conditioning with radiator heat.

Second prize in the contest, which was conducted as part of a modernization program sponsored by the company, was awarded to an urban contractor, William Merten, of 401 West 48th St., New York, who won a trip to Bermuda for himself and Mrs. Merten, In both cases, the men can receive alternate cash prizes if they prefer, with $1,000 given for the first prize and $500 for the second.

Williams of Frigidaire Elected President of Refrigerating Engineers at 32nd Annual Meeting of ASRE

NEW YORK—A three-day program of technical papers, the election of officers, approval of a code for rating and testing of air conditioning equipment, and attendance at the Power Show and sessions of the annual meeting of the ASME held simultaneously here, kept members of the American Society of Refrigerating Engineers extremely busy at their 32nd annual meeting held at the Hotel Pennsylvania, December 2-4. Approximately 350 were registered.

Harry M. Williams of Frigidaire Corp., was elected president, succeeding L. S. Morse.

The meeting was opened by President L. S. Morse who introduced W. S. Shipley as guest chairman of the first session. Mr. Shipley gave a brief talk which was followed by a paper, "Comfort Cooling in the Research Residence at the University of Illinois," by Profs. A. P. Kratz and H. J. Macintire, of the University of Illinois, Urbana, Ill. This paper, read by John James, technical secretary of the ASHVE, in the absence of Professors Kratz and Macintire, was a summary of all the house cooling studies made at Illinois.[1]

"Air Conditioning Requirements of Multicolor Offset Printing" was the subject of a research paper by C. G. Weber, of the Bureau of Standards, Washington, describing the effect of moisture conditions on paper used for offset printing. Mr. Weber commented on the importance of constant air conditions where offset printing is done and showed data indicating that there is a straight line relationship between change in the moisture content and the dimension of the paper. He said: "Offset papers that are conditioned to equilibrium with the air

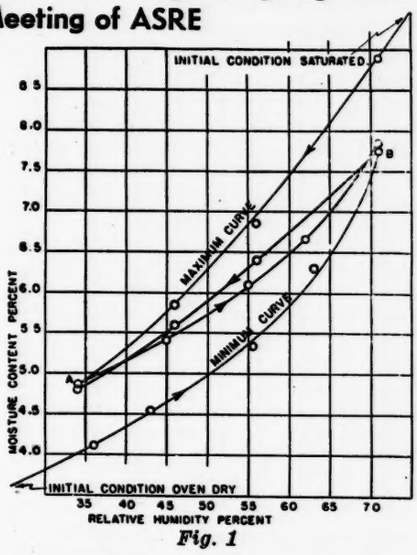


Fig. 1

in a print shop are normally near the lower limit of equilibrium moisture content, represented by the lower or absorption curve in Fig. 1. This is because they are commonly dried to less than 5% moisture to permit calendering in manufacture. Hence, conditioning to equilibrium with the atmosphere in the ordinary print shop is by absorption because the relative humidity generally maintained in shops with humidity control corresponds to about 5% moisture in the conditioned paper. Since the moisture content at equilibrium is below the maximum or desorption curve, it is possible for the paper to hold more moisture and still be in equilibrium. Apparently, this is exactly what happens when papers in this condition are printed.

"Papers not in equilibrium with the pressroom air at the start of a printing reach equilibrium after five or six colors have been printed, which indicates that the exposure during printing is sufficient to adjust the moisture content slowly to a constant amount. Thus, if papers not in equilibrium at the start will reach equilibrium with the surrounding air as a result of the exposure during printing, it is obvious that papers in equilibrium at the start should remain so. This has been found to be the case. However, it is evident from Fig. 1, and has been found by printing tests, that this equilibrium does not correspond to a definite moisture content. If the paper is below the condition of maximum moisture content, illustrated by the desorption curve in Fig. 1, at the start, the moisture content will increase during printing while the paper remains in equilibrium. This is due to the manner in which the press is picked up and held. All increases in moisture content are accompanied by expansion, and therefore affect the register of prints. Papers conditioned to equilibrium with the pressroom air by absorption, then printed in five colors or more, usually gain 0.5% of moisture and remain in equilibrium with the same atmospheric humidity. It is essential that this increase in moisture content during printing be avoided to prevent register difficulties. Two methods of avoiding it have been found to be successful and both require special conditioning of the paper in preparation for printing."

The two methods described by Mr. Weber were (1) to adjust the hygrometric conditioning of the paper so as to place it on the upper or desorption curve, in which condition it cannot absorb additional moisture and remain in equilibrium, and (2) raising the initial moisture content by desorption above equilibrium with the pressroom air by 0.5%.

Walter L. Fleisher, consulting engineer of New York, presented his paper on "Evaporative Cooling for Comfort."

At the second session, Byron E. James, York Ice Machinery Corp., presented his paper on "The Study of Heat Transfer in Unit Refrigerant Condensers Which Use Evaporative Cooling," which was followed by one on "Moisture in Insulating Walls," by Harvey B. Lindsay.

[1]The material covered by this paper was covered in an eight-page section entitled "Five Methods of Cooling a Residence," in the September, 1936, issue of HEATING & VENTILATING.

Officials of Airtemp, Inc., who participated in the company's two-day meeting held at Dayton. Left to right: Col. A. C. Downey, president of Airtemp; A. R. Fors, works manager; H. C. Jamerson, assistant to the vice-president; E. W. Garbisch, vice-president of J. Stirling Getchell, Inc., New York advertising representatives; A. C. Staley, vice-president in charge of engineering for Airtemp, and F. R. Wolfe, secretary-treasurer.

Chester Lichtenberg. General Electric Company, Fort Wayne, Indiana, presented a paper on "Standards for Use in Refrigeration Engineering."

The third session was a joint one with the ASME and included a paper on "Method of Computing Thermal Properties of Oxygen Nitrogen, and Derivation of a New Equation of State Therefor," presented by title, and "Leakage of Gases Through Narrow Channels," by A. Egli, Westinghouse Electric & Manufacturing Co., East Pittsburgh, also presented by title.

The principal paper at this session and which attracted a large attendance was "A Review of Existing Psychrometric Data in Relation to Practical Engineering Problems," by W. H. Carrier and Prof. C. O. Mackey, Cornell University, Ithaca, N. Y. Professor Mackey presented the paper in which the authors reviewed and correlated available psychrometric data and discussed their application. They analyzed and correlated existing data with reference to deviations of observed wet bulb temperatures from those of true adiabatic saturation. The paper also included a tabulation of revised psychrometric values in accordance with the latest physical data with correction factors for all normal variations of barometric pressures. The authors made an analysis and gave a demonstration of the proper method of employing the psychrometric heat function previously defined as the "total heat less the heat of the liquid," and afterward referred to in psychrometry as "total heat." For this function the authors offered the term "sigma function," to distinguish it from the enthalpy or true heat which includes the heat of the liquid.

At the closing session Glenn F. Zellhoefer, Williams Oil-O-Matic Heating Corp., presented a paper on "Commercial Refrigeration by Low Pressure Steam." The author described a refrigerating unit for air conditioning designed to operate on low pressure steam or hot water.

W. E. Stark, vice-president of The Bryant Heater Co., then presented a paper on "Modern Equipment for Dehumidification by Adsorption." Mr. Stark pointed out that several agents are available for direct dehumidification and that these include silica gel, activated alumina, lithium chloride, calcium chloride, lamisilite, etc.

Other officers elected, in addition to Mr. Williams, were: Gardner Poole, Frosted Foods Sales Corp., vice-president; George E. Hulse, Safety Car Heating & Lighting Co., New Haven, Conn., treasurer. The following directors were elected: L. L. Lewis, vice-president and chief engineer, Carrier Corp.; H. D. Edwards, consulting engineer, Union Carbide & Chemicals Corp.; L. A. Philipp, research engineer, Kelvinator Corp.; H. C. Guild, eastern sales manager, Vilter Mfg. Co.; C. T. Baker, consulting engineer, Atlanta.

Sun Spots Affect Air

BOSTON—Possibility that sun spots may affect the air we breathe is advanced by Prof. Harlan T. Stetson, research associate in geophysics at the Massachusetts Institute of Technology.

Definite correlation has been established, he said, between the 11-year sun spot cycle and plant growth, as evidenced in the width of tree rings. Professor Stetson thinks that the actual nature of sunlight may undergo a change because of the sun spots. He is experimenting now at M.I.T. with the problem, and thinks he finds a relationship between the charged electrical particles in the earth's atmosphere and the solar emanations. These ions affect the physical condition of human beings, and any proven change in their nature caused by solar activity would be of great scientific value.

Convery Addresses Jersey Group

NEWARK, N. J.—Neil J. Convery, state architectural supervisor of the FHA, addressed a meeting of the Air Conditioners Association of New Jersey, December 7.

Mr. Convery explained the reasons for the regulations which will become enforceable by the Federal Housing Administration on the first of February, 1937. He said many complaints have reached his office regarding improper installation of risers, ducts, and air conditioning equipment so it is becoming necessary to make mandatory the new regulations which will be rigidly enforced.

He explained that after inspection of the installation of risers in a building, the bank, trust company, or building loan association financing the project will be advised of any defect and will be warned that FHA expects it to have the imperfections corrected in order to receive the insurance protection of FHA.

Among the features which he said would be insisted upon will be the installation of metal-lined cold air returns. He said serious fires have been caused where unlined stud spaces have been used for cold air returns.

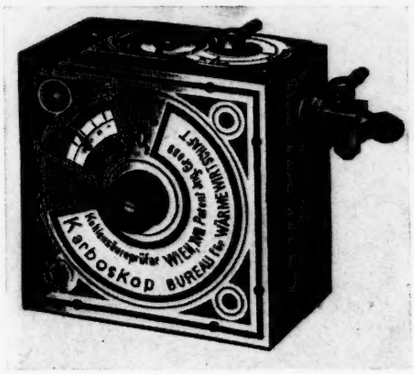
Detroit Group Hears G-Man

DETROIT — The Michigan Chapter, ASHVE, met November 9 and celebrated the nomination of one of its members, J. F. McIntire, as second vice-president of the national society. Mr. McIntire, who has been a member of the society since 1914, has served on an imposing number of committees.

Seventy-nine members and guests were present at the meeting. Cecil Farrar acted as toastmaster. James D. Cunningham, of the Federal Bureau of Investigation, was the guest speaker of the evening.

Meeting of the Michigan chapter, ASHVE, honoring J. F. McIntire, shown third from right at speakers' table.

NEW EQUIPMENT



Carboscope CO_2 Analyzer

NAME—Carboscope CO_2 analyzer.

PURPOSE—A small pocket-size apparatus for determining the percentage of carbon dioxide in gases.

FEATURES—The manufacturer states that this apparatus is entirely made of metal, does not contain any liquid, and may be operated by any untrained person. It is said that an analysis may be made within one half a minute which will be accurate to 1/3 of 1%. In making the analysis, a sample of the gases is pumped by a small rubber pump through the apparatus; two valves are then closed and the apparatus is then inverted three times. The dial on the front of the instrument is then turned until a small lamp lights. The position of an arrow then indicates the percentage of carbon dioxide.

SIZE—The size of the instrument is approximately 3½ x 3½ x 2 in. and weighs about 2 lb. It is said that approximately 500 analyses can be made before the chemical has to be renewed.

MADE BY—Versuchsanstalt fuer Heiz-, Gas- und Kaeltetechnik, Vienna, Austria.

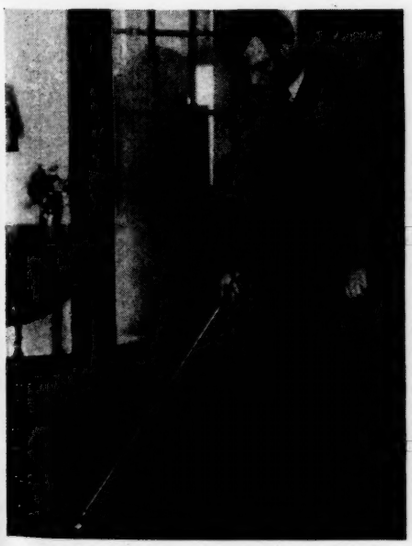
INFORMATION AVAILABLE FROM *Walter Kohn, c/o The Imco Co., 45 West 16th St., New York.*

Gil Radiation Computer

NAME—Gil radiation computer.

PURPOSE—For estimating house heating and air requirements of buildings.

METHOD OF OPERATION—To compute the cubic contents of a room, the instrument is rolled along the length and width of the floor, and then up the wall, thus measuring the three dimensions of the room. An indicator set in the hand then gives the cubic contents.



FEATURES—The instrument is 3 ft. long and can be folded and placed in a small leather case. It is said to offer a quick and accurate method of computing radiator surface requirements, areas, and cubical contents. It has also been found useful for determining the lineal feet of pipe required.

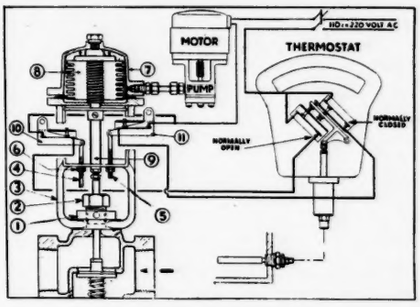
MADE BY—*Gas Industry Laboratories, Inc., 12-22—30th Ave., Astoria, Long Island, N. Y.*

Sarco Electric Temperature Control Systems

NAME—Sarco electric temperature control systems.

PURPOSE—To automatically control temperatures in a wide variety of applications.

FEATURES—System consists of either of two types of electric thermostats and hydraulic motor valve. The first type thermostats, models LSI and L2SI, have a flexible tube connection between the head and the sensitive control. The temperature is indicated on an accurate dial thermometer. Adjustment of the control temperature can be made while the instrument is in operation by turning a screw which moves a red indicator over the scale. The principle of operation is the expansion of a temperature sensitive liquid which compresses a bellows which in turn operates an electric switch and the temperature indicating pointer.

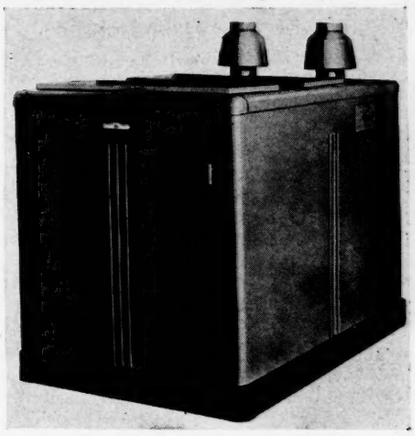


The second type thermostats, models LSC and L2SC, are similar to the first except that the indicating feature is omitted. All thermostats have ranges between —40F and 650F.

There are two types of hydraulic motor valves available which were designed expressly for use with the above thermostats. Type G is of the open-and-shut type. The thermostat starts and stops a motor-driven vane pump to build up oil pressure in the bellows chamber. This compresses bellows to which the valve push rod is attached. A limit switch interrupts the circuit momentarily at the end of the stroke, causing the valve to oscillate slightly in the wide open position. When the thermostat opens the electric circuit, the valve returns automatically to the closed position by spring pressure. Type GT is of the throttling type. It is used with double switch thermostats. An additional limit switch is provided at the half-way point in the valve stroke so that the valve can be held open at this point, between opening wide or closing all the way. The positions of both limit switches are adjustable by the user, who can readily regulate both the full open and the throttling positions of the valve, to secure accurate temperature control under given conditions of load. These instruments are based on patents and designs which Sarco has acquired from the Wilbin Instrument Corp.

AVAILABLE SIZES—Valves available in sizes from ⅜ to 4 in.

MADE BY—*Sarco Co., Inc., 183 Madison Ave., New York.*



G-E Gas-Fired, Warm-Air Conditioner

NAME—G-E gas-fired, warm-air conditioner.

PURPOSE—A direct-fired air conditioner developed especially for residential winter service. Cooling coils for summer air conditioning may be added at a later date.

FEATURES—Unit has a one-piece, cast-iron heating unit which is said to eliminate possibility of flue gas leaks, an electric pilot switch prevents the opening of the main gas valve until all pilots are burning. A fully automatic humidity control and thermostat are included. Heating surfaces include radiation screens of sheet metal.

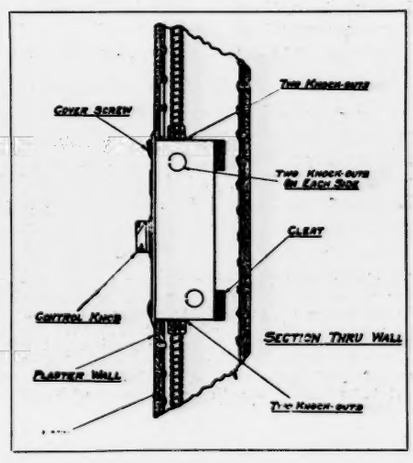
MADE BY—*General Electric Co., Bloomfield, N. J.*

Baldor Unit Heater Controller

NAME—Unit heater meter controller, flush type.

PURPOSE—A flush type controller in an attractive case for installation in offices, halls, lobbies, and other prominent spaces where the surface type would not harmonize with the surroundings. Control is designed for the same service as the surface type controllers. The box is designed to fit into a partition wall and is fastened as any other junction box. The control mechanism is assembled on a separate frame and can be removed while the box is being fitted in space. The cover fits flush over the box and to the wall similar to a wall switch or outlet. Cover is finished in either black crackle or brushed brass. Available in two capacities, 1/3 and 1/6 hp.

MADE BY—*Baldor Electric Co., St. Louis, Mo.*



Final Degree-Day Figures for November, 1936

HEATING & VENTILATING continues its ninth year of publishing degree-day data for various large cities. The figures on this page are the final ones for November, 1936, while the preliminary figures for December, 1936, appear on page 142.

	Albany, N. Y.	Atlanta, Ga.	Baltimore, Md.	Birmingham, Ala.	Boston, Mass.	Buffalo, N. Y.	Burlington, Vt.
Degree-days for November, 1936	841	454	587	417	769	904	1016
Degree-days, Sept. 1, 1936 to Nov. 30, '36	1352	544	810	491	1229	1446	1762
Degree-days, Sept. 1, 1935 to Nov. 30, '35	1201	427	699	389	1061	1306	1558
Degree-days, Sept. 1 to Nov. 30, Normal	1292	492	790	318	1104	1268	1486

	Cheyenne, Wyo.	Chicago, Ill.	Cincinnati, Ohio	Cleveland, Ohio	Columbus, Ohio	Denver, Colo.	Des Moines, Iowa
Degree-days for November, 1936	884	815	747	784	797	697	850
Degree-days, Sept. 1, 1936 to Nov. 30, '36	1735	1241	1081	1207	1159	1316	1314
Degree-days, Sept. 1, 1935 to Nov. 30, '35	1816	1205	957	1079	1017	1327	1378
Degree-days, Sept. 1 to Nov. 30, Normal	1745	1112	863	1125	1003	1259	1155

	Detroit, Mich.	Dodge City, Kan.	Duluth, Minn.	El Paso, Tex.	Erie, Pa.	Evansville, Ind.	Wort Wayne, Ind.
Degree-days for November, 1936	886	645	1240	434	823	676	845
Degree-days, Sept. 1, 1936 to Nov. 30, '36	1420	1103	2261	581	1272	907	1301
Degree-days, Sept. 1, 1935 to Nov. 30, '35	1318	1087	2292	455	1148	774	1242
Degree-days, Sept. 1 to Nov. 30, Normal	1219	948	1943	421	1125	683	1082

	Grand Rapids, Mich.	Harrisburg, Pa.	Hartford, Conn.	Indianapolis, Ind.	Kansas City, Mo.	La Crosse, Wis.	Lincoln, Neb.
Degree-days for November, 1936	871	734	784	770	674	970	751
Degree-days, Sept. 1, 1936 to Nov. 30, '36	1443	1077	1255	1129	1001	1618	1189
Degree-days, Sept. 1, 1935 to Nov. 30, '35	1319	920	1046	1053	1055	1580	1335
Degree-days, Sept. 1 to Nov. 30, Normal	1250	989	1097	985	826	1467	1069

	Little Rock, Ark.	Los Angeles, Calif.	Louisville, Ky.	Madison, Wis.	Memphis, Tenn.	Milwaukee, Wis.	Minneapolis, Minn.
Degree-days for November, 1936	478	37	697	962	505	885	1044
Degree-days, Sept. 1, 1936 to Nov. 30, '36	620	62	954	1600	651	1447	1715
Degree-days, Sept. 1, 1935 to Nov. 30, '35	583	169	783	1516	576	1331	1752
Degree-days, Sept. 1 to Nov. 30, Normal	428	123	738	1437	464	1380	1537

	Nashville, Tenn.	New Haven, Conn.	New Orleans, La.	New York, N. Y.	Norfolk, Va.	Oklahoma City, Okla.	Omaha, Neb.
Degree-days for November, 1936	582	731	178	681	449	526	823
Degree-days, Sept. 1, 1936 to Nov. 30, '36	749	1153	190	988	544	803	1292
Degree-days, Sept. 1, 1935 to Nov. 30, '35	635	976	189	816	441	788	1408
Degree-days, Sept. 1 to Nov. 30, Normal	619	1092	102	894	510	564	1109

	Peoria, Ill.	Philadelphia, Pa.	Pittsburgh, Pa.	Portland, Me.	Portland, Oreg.	Providence, R. I.	Reading, Pa.
Degree-days for November, 1936	816	646	738	871	586	772	707
Degree-days, Sept. 1, 1936 to Nov. 30, '36	1224	904	1079	1510	882	1225	1044
Degree-days, Sept. 1, 1935 to Nov. 30, '35	1231	729	950	1326	1074	1039	880
Degree-days, Sept. 1 to Nov. 30, Normal	1173	830	982	1343	995	1103	1013

	Richmond, Va.	Rochester, N. Y.	St. Louis, Mo.	Salt Lake City, Utah	San Francisco, Calif.	Scranton, Pa.	Seattle, Wash.
Degree-days for November, 1936	529	903	645	822	210	825	567
Degree-days, Sept. 1, 1936 to Nov. 30, '36	699	1411	909	1256	425	1305	1012
Degree-days, Sept. 1, 1935 to Nov. 30, '35	606	1257	924	1253	597	1174	1158
Degree-days, Sept. 1 to Nov. 30, Normal	641	1289	802	1129	521	1189	1165

	Spokane, Wash.	Syracuse, N. Y.	Toledo, Ohio	Trenton, N. J.	Utica, N. Y.	Washington, D. C.	Wichita, Kan.
Degree-days for November, 1936	980	864	848	716	879	609	608
Degree-days, Sept. 1, 1936 to Nov. 30, '36	1566	1370	1314	1050	1425	837	955
Degree-days, Sept. 1, 1935 to Nov. 30, '35	1614	1258	1230	881	1356	717	1012
Degree-days, Sept. 1 to Nov. 30, Normal	1526	1319	1110	830	1393	845	828

To obtain unit fuel consumption figures for any city shown above, multiply the number of degree-days by the following factors: for coal, 0.008; for oil, 0.00069; for gas, 0.096. Figures obtained will show coal consumption in pounds per square foot of radiator surface; oil consumption in gallons per square foot; gas consumption in cubic feet per square foot—all for the period covered by the number of degree-days. The figures assume the use of steam radiators emitting 240 B.t.u. per sq. ft. per hr., a system operation at 100% efficiency, and radiators calculated for maintaining 70° in zero weather. Heating values assumed for the fuels are 12,000 B.t.u. per lb. for coal; 140,000 B.t.u. per gal. for oil, and 1,000 B.t.u. per cu. ft. for gas. To correct for other heating values, efficiency and design conditions, follow the method explained in the "HEATING & VENTILATING Degree-day Handbook" or on H. & V.'s Reference Data Sheet Nos. 67 and 68. Degree-days as given above for a "normal" month or season are based on averages for a long period of years, ending about 1922. Averages covering different periods will disagree with the above figures slightly.

TABLE 1

HEAT ADDED TO STILL AIR AT 70° BY HOT PIPE WITHOUT PIPE COVERING

Nominal Pipe Diam. (Inches)	Temperature of Hot Substance (Usually Steam or Hot Water) in Pipe															
	100°		120°		150°		180°		210°		240°		270°		300°	
	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing	Iron and Steel	Copper Tubing
½	14.5	8.5	25.0	14.9	41.9	25.6	61.5	37.8	83.4	51.5	151.8	65.5	134.0	81.5	163.0	98.5
¾	17.5	11.2	30.0	19.8	51.2	33.9	75.4	50.0	102.5	68.0	132.0	87.1	164.0	108.0	200.0	131.0
1	22.0	14.2	37.4	24.8	63.5	42.5	94.0	62.8	127.0	84.8	163.0	108.8	202.0	135.5	248.0	164.0
1¼	27.0	17.0	46.0	29.6	78.0	50.8	114.0	74.5	158.0	101.5	200.0	130.5	249.0	161.0	304.0	196.0
1½	31.0	19.8	52.2	34.3	88.4	58.8	129.0	86.4	176.0	117.5	228.0	156.0	284.0	187.0	344.0	228.0
2	38.0	25.4	64.2	44.2	108.0	74.1	159.0	111.2	208.0	150.0	277.0	190.5	347.0	241.0	423.0	292.0
2½	45.0	30.6	76.5	52.8	129.0	90.5	189.0	134.0	257.0	180.0	332.0	232.0	414.0	288.0	505.0	350.0
3	54.0	35.9	92.0	63.0	155.0	106.0	228.0	156.0	306.0	211.0	399.0	272.0	500.0	338.0	606.0	411.0
3½	61.0	41.0	104.0	71.0	175.0	121.0	256.0	178.0	339.0	243.0	450.0	311.0	566.0	386.0	685.0	497.0
4	69.0	46.2	116.0	79.5	196.0	131.0	286.0	199.7	394.0	271.0	502.0	349.0	625.0	432.0	765.0	526.0
5	83.0	56.3	141.0	96.5	237.0	165.0	348.0	242.0	474.0	329.0	611.0	424.0	762.0	525.0	932.0	640.0
6	98.0	66.5	166.0	114.0	280.0	195.0	412.0	286.0	557.0	389.0	720.0	500.0	890.0	623.0	1095.0	759.0
8	127.0	—	213.0	—	358.0	—	524.0	—	712.0	—	918.0	—	1148.0	—	1400.0	—
10	156.0	—	262.0	—	440.0	—	648.0	—	875.0	—	1128.0	—	1410.0	—	1728.0	—
12	185.0	—	307.0	—	523.0	—	755.0	—	1020.0	—	1327.0	—	1652.0	—	2020.0	—

Figures are B.t.u. per hour per linear foot.

DIMENSIONS OF STANDARD IRON AND STEEL PIPE

Nominal Pipe Diam. (Inches)	Outside Diam. (Inches)	Sq. Ft. Area Per Linear Foot (Outside)	Nominal Pipe Diam. (Inches)	Outside Diam. (Inches)	Sq. Ft. Area Per Linear Foot (Outside)
½	0.840	0.22	3½	4.00	1.047
¾	1.050	0.275	4	4.50	1.178
1	1.315	0.344	4½	5.00	1.306
1¼	1.660	0.435	5	5.563	1.455
1½	1.900	0.498	6	6.625	1.734
2	2.375	0.622	8	8.625	2.257
2½	2.875	0.753	10	10.75	2.818
3	3.50	0.917	12	12.75	3.338

DIMENSIONS OF COPPER TUBING

Nominal Pipe Diam. (Inches)	Outside Diam. (Inches)	Sq. Ft. Area Per Linear Foot (Outside)	Nominal Pipe Diam. (Inches)	Outside Diam. (Inches)	Sq. Ft. Area Per Linear Foot (Outside)
½	0.625	0.166	2½	2.625	0.687
¾	0.875	0.229	3	3.125	0.82
1	1.125	0.295	3½	3.625	0.95
1¼	1.375	0.360	4	4.125	1.08
1½	1.625	0.425	5	5.125	1.34
2	2.125	0.562	6	6.125	1.61

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HEAT LOADS OF UNINSULATED HOT AND COLD SURFACES

Frequently, the air conditioning estimator has to take into account the heat loss or heat gain from or to hot or cold uninsulated surfaces located in the space to be conditioned. To help him to estimate with reasonable accuracy the magnitude of these heat quantities is the purpose of this data sheet.

It is agreed that in the case of either hot or cold surfaces, heat is transferred by the processes of convection and radiation, and for practical purposes the heat quantities involved can be estimated if the heat transferred by these two methods can be found and totaled. The problem of estimating heat quantities thus reduces itself to finding ways of calculating the radiated and convected heat. Radiated heat can be calculated by the formula of Stefan-Boltzmann. The formula is:

$$H_r = 0.1723 \times e \left(\frac{T_1}{100}\right)^4 - \left(\frac{T_2}{100}\right)^4 \quad \ldots\ldots (1)$$

in which

H_r = *radiated heat transferred in B.t.u. per sq. ft. per hr.,*
T_1 = *absolute temperature of warmer body,*
T_2 = *absolute temperature of colder body,*
e = *the effective emissivity of both bodies.*

At temperatures in the vicinity of those frequently encountered in air conditioning work, the values of e for many types of surfaces have been determined by Heilman. Some of the values are shown in Table A.

A point in using this formula which does not seem clear to many persons is that the values of e as reported by investigation and as listed in Table A are not always suitable for use at once in formula (1). It should be noted that e in the formula is defined as "effective emissivity" of both bodies concerned in the heat transfer. Where the "effective emissivity" of both bodies is the same as that of the hot body then e from the table can be used at once. Fortunately, in the usual case of pipes carrying hot or cold substances in the air of an ordinary room, this condition prevails and the radiation heat for this condition is closely estimated by using e equal to 0.90 to 0.94. Where large ducts carry air through a small room, however, this condition does not prevail and in such cases the results obtained by using the formula may be greatly in error if the wrong selection of the value of e is made.

The convection heat can be calculated by the use of Rice-Heilman formula which follows:

$$H_c = C \left(\frac{1}{D}\right)^{0.2} \left(\frac{1}{T_{av}}\right)^{0.181} \left(t_s - t_a\right)^{1.266} \quad \ldots (2)$$

TABLE A

	Temperature	
	100F	400F
Galvanized Iron		
Bright	0.44	0.17
Tarnished	0.53	0.53
Copper		
Bright	0.07	0.11
Tarnished	0.43	0.48
Aluminum Foil	0.06	—

in which

H_c = *convection heat transferred, B.t.u. per sq. ft. per hr.,*
C = *a constant whose value depends on the shape of the solid. For a horizontal cylinder such as pipe, $C = 1.016$; for a vertical plate, $C = 1.394$; for horizontal plates warmer than the surrounding air and facing upward, $C = 1.79$; for such a plate facing downward, $C = 0.89$,*
D = *diameter of pipe or circular duct, in.,*
T_{av} = *average temperature of solid surface and surrounding air, F.*
T_s = *temperature of surface of solid,*
T_a = *temperature of surrounding air.*

Table 1, which appears on the other side of this sheet, gives values of the heat transfer to still air at 70F by bare iron and steel pipes and copper tubing. This table was computed from formulas (1) and (2) and illustrates how these formulas can be used in solving practical problems. In the table the heat quantity shown is per foot of pipe length. The quantities shown are for the air at 70F but can be used without serious errors for estimating purposes from 60F to 80F.

In the cases where cold substances flow through pipes in still air, the data available are not as complete as they are for hot substances. By using the above formulas, however, the estimator can expect to get reasonably close estimates. The trouble in determining the heat flow to cold surfaces lies in the fact that the estimator has to solve the equation each time he wishes to find a heat quantity. This can be done by using a value from 0.90 to 0.94 for e for iron and steel pipes and of 0.57 for copper tubing in formula (1) and a value of C of 1.1016 in formula (2).

Where sheet metal ducts carry either hot or cold air through rooms which are at ordinary temperatures, the heat quantities may be estimated by applying formulas (1) and (2) as necessary. Care must be taken, however, in evaluating C in formula (2). There is some evidence that for ordinary rectangular ducts, the value of C should be fixed at 1.394.

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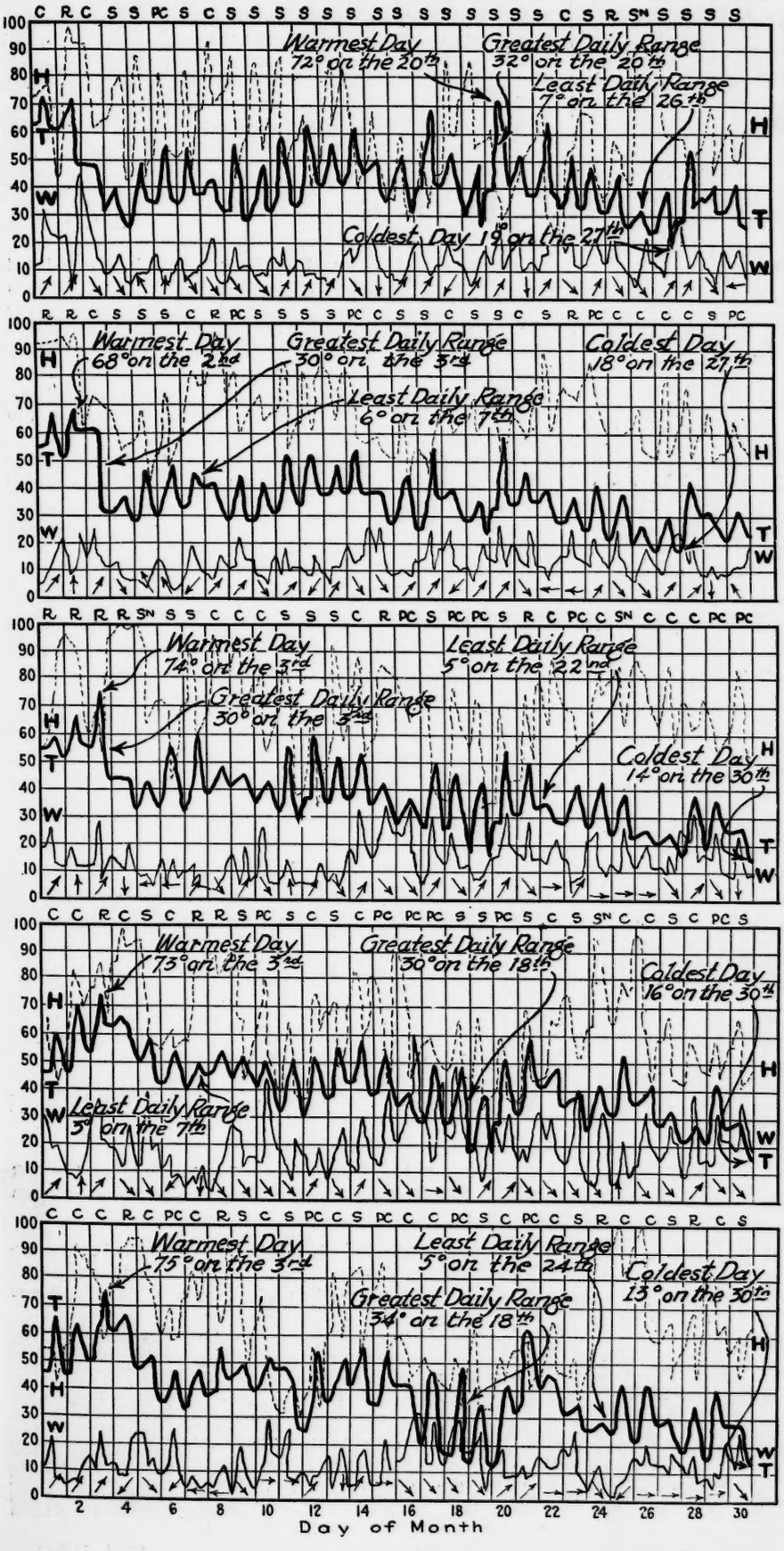
THE WEATHER FOR NOVEMBER, 1936

Plotted from records compiled for HEATING & VENTILATING by the U. S. Weather Bureau. Heavy curves (T), dry bulb temperatures in deg. F.; dotted lines (H), per cent relative humidity from readings at 8 a.m., noon, and 8 p.m. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions, north being arrow pointing up, etc.; S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.


Warmest Day 72° on the 20th
Greatest Daily Range 32° on the 20th
Least Daily Range 7° on the 26th
Coldest Day 19° on the 27th
Warmest Day 68° on the 2nd
Greatest Daily Range 30° on the 3rd
Least Daily Range 6° on the 7th
Coldest Day 18° on the 27th
Warmest Day 74° on the 3rd
Greatest Daily Range 30° on the 3rd
Least Daily Range 5° on the 22nd
Coldest Day 14° on the 30th
Warmest Day 73° on the 3rd
Greatest Daily Range 30° on the 18th
Least Daily Range 3° on the 7th
Coldest Day 16° on the 30th
Warmest Day 75° on the 3rd
Least Daily Range 5° on the 24th
Greatest Daily Range 34° on the 18th
Coldest Day 13° on the 30th
Day of Month

St. Louis

Mean temp. for month, 43.4F; aver. wind velocity, 12.5 m.p.h.; prevailing direction of wind, NW.

Chicago

Mean temp. for month, 38.0F; aver. wind velocity, 12.1 m.p.h.; prevailing direction of wind, NW.

Pittsburgh

Mean temp. for month, 38.2F; aver. wind velocity, 12.8 m.p.h.; prevailing direction of wind, SW.

New York

Mean temp. for month, 42.4F; aver. wind velocity, 17.2 m.p.h.; prevailing direction of wind, NW.

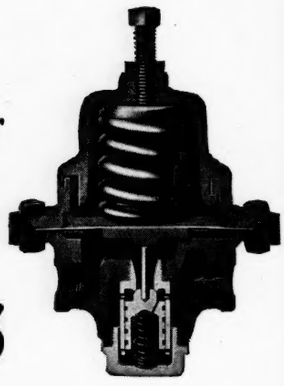
Boston

Mean temp. for month, 39.6F; aver. wind velocity, 11.3 m.p.h.; prevailing direction of wind, W.

No. 13

—a good regulator for service on

UNIT HEATERS

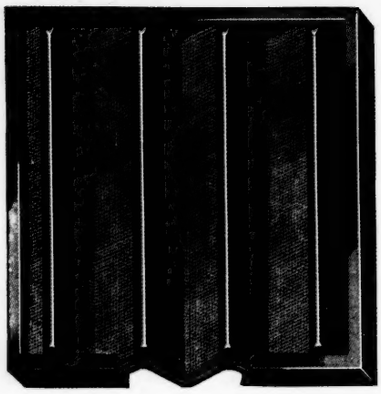


HERE'S the pressure regulator that's just right for insuring a highly uniform reduced steam pressure for unit heaters, laundry ironers, hospital sterilizers, steam tables, retorts, vulcanizers, etc. Simple in design and remarkably convenient to use, No. 13 is truly a modern regulator: spring cap removable by hand . . . built-in strainer . . . all parts accessible without breaking pipe connections . . . tight closing maintains pressure reduction regardless of circulation. For reduced pressures from 1 to 100 lbs. on steam, air, or gas service. Write for literature.

DAVIS REGULATOR COMPANY
2553 S. Washtenaw Avenue, Chicago, Illinois

Advantages of **somers'**
WASHABLE "HAIR GLASS" FILTERS

1. *Maximum of dust, soot and bacteria separation*
2. *Requires no adhesive, coating or impregnation*
3. *Washable*
4. *Indestructible in normal service*
5. *Minimum low pressure drop*
6. *Does not rot nor disintegrate in service*
7. *Odorless and non-absorpive*



Somers' Hair Glass Filters have made a splendid record on innumerable air-conditioning and manufacturing installations. Developed in V type and Flat type with choice of No. 1, 2, and 3 Pack, these filters solve the problem of constant filtering efficiency at minimum expense.

FULL PARTICULARS ON APPLICATION

H. J. SOMERS, INC.
AIR CONDITIONING SPECIALISTS
6065 WABASH AVE., DETROIT, MICH.

WITH THE MANUFACTURERS

Anthracite Industries, Inc., New York, has appointed **E. E. Finn,** formerly with the Lehigh Navigation Co., as assistant to the president. Mr. Finn has been associated with Anthracite Industries since August 1 and has assisted in the development of the program to date.

He will direct the activities of the field representatives and contacting work with manufacturers, representatives, and dealers.

E. E. Finn

Anthracite Industries, Inc., New York, has appointed **E. L. Buller** sales engineer. Mr. Buller joined The Hudson Coal Co. in 1925, and in 1929 was placed in charge of the equipment and chemical laboratories and acted in an advisory capacity to the service engineers. In 1932, Mr. Buller was appointed research engineer and until he joined Anthracite Industries was in charge of experimental work on new uses of anthracite. He was also a member of the Anthracite Institute Laboratory's engineering advisory committee.

The following have been added to the field staff of Anthracite Industries, practically completing the staff and bringing the total number of men in the field to 19: **Walter A. Brown,** Philadelphia; **William J. Cusack,** Buffalo, N. Y.; **Bernard V. Denk,** New York; **Thomas F. Lennon,** Milwaukee; **L. E. Smith,** Washington, D. C.; **J. H. Tattersall,** Lutherville, Md.

E. L. Buller

American Radiator Co., New York, announces that **R. F. L'Hote,** manager of the Allied Products Division of American Radiator Company, has just been named a vice-president of the company. Mr. L'Hote, who entered the company in 1910 as a junior salesman in the Chicago branch, has been manager of the Allied Products Division for two years and has been assistant general manager of sales for eight years. He has served the company as a salesman in the Indianapolis Branch, as office supervisor in that branch, and as office supervisor and credit manager of the Detroit Branch, from which position he was transferred to the company's general offices in 1919. He is a graduate of Northwestern University. As manager of the Allied Products Division of the company since its creation in 1935, Mr. L'Hote has been in charge of the sale of oil burning boilers, copper pipe and fittings, accessories, and other products merchandised by the company.

Carrier Corp., Newark, N. J., has announced a 5% increase in wages for all hourly employes, retroactive as of December 11.

Crane Co., Chicago, announces that **T. M. Lowe** has left the Walter J. Bryant Corp., to join Crane's sales promotion staff.

Diehl Manufacturing Co., Elizabethport, N. J., has appointed **William J. Jockers** assistant sales manager. He was affiliated for more than 26 years with Westinghouse Electric & Manufacturing Co. and the Westinghouse Electric Supply Co. He served as manager of the fan motor division and later as specialist on control and motor sales in the eastern district.

In the supply organization his position was that of district manager, first in the north-western district, then in the central district, and finally in the eastern district with headquarters at New York.

W. J. Jockers

The Electroaire Corp., Chicago, has appointed the **Des Moines Steel Co.**, 421 S.W. Fourth St., Des Moines, Ia., as its representative in Des Moines, and **Air Conditioning Utilities, Inc.**, 8 W. 40th St., New York, as representative in New York.

Electrol Incorporated, Clifton, N. J., announces payment in full of its funded indebtedness to **Petroleum Heat and Power Co., Inc.**, consisting of five-year serial notes running to 1941 of slightly more than $100,000. This payment terminates and concludes all financial relationships between these two competitive corporations and leaves Electrol with no indebtedness of any kind excepting current operating items not due for payment.

Frick Co., Inc., Waynesboro, Pa., has appointed **John T. Murphy** branch manager of its New York office with headquarters at 370 Lexington Ave. Mr. Murphy has been connected with Frick since 1916.

Owens-Illinois Glass Co., Telodo, Ohio, has appointed **D. H. Corlette** to its fibrous glass division sales staff. For the past 14 years Mr. Corlette has been associated with the Wood Conversion Co. He was responsible for numerous innovations and inventions in insulation, particularly in domestic refrigeration. **Alexander T. Bush** has been appointed to the sales staff of the industrial materials division.

Parks, Cramer Co., Fitchburg, Mass., has issued a $60,000 bonus to its employes. Those employed more than five years will receive six weeks extra pay.

Sarco Co., Inc., 183 Madison Ave., New York, announces the completion of a new line of controls for heating and air conditioning based on patents and designs Sarco has acquired from **Wilbin Instrument Corp.**, which has been liquidated.

United States Radiator Corp., Detroit, Mich., has appointed **T. R. Flanagan**, former manager of its Baltimore branch, manager of the company's New York branch. To honor Mr. Flanagan, associates of the New York and nearby branches held a luncheon at the Hotel Commodore, New York, November 24. **C. R. Hines** has been named assistant manager of the New York branch.

Worthington Pump and Machinery Corp., Harrison, N. J., has absorbed its subsidiary, **Carbondale Machine Corp.**, as of January 1, 1937. Carbondale organization, products, and sales activities, have been continued as a division of Worthington.

COMING EVENTS

JANUARY 25-27, 1937. 43RD ANNUAL MEETING OF THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, *Hotel Statler, St. Louis, Mo.*

MARCH 15-19, 1937. NATIONAL OIL BURNER AND AIR CONDITIONING EXPOSITION, *Commercial Museum, Philadelphia. Sponsored by the Oil Burner Institute, New York.*

MAY 17-21, 1937. 48TH ANNUAL CONVENTION OF THE HEATING, PIPING AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, *Hotel Nicollet, Minneapolis, Minn.*

MAY 24-27, 1937. 55TH ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION OF MASTER PLUMBERS, *Atlantic City, N. J. Convention headquarters at the Ambassador Hotel. In connection with the convention, The 1937 Home Comfort Exposition will be held in the Atlantic City Auditorium.*

MAY 25-27, 1937. SPRING MEETING OF THE AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, *French Lick Springs, Ind.*

MAY 25-27, 1937. 4TH SHORT COURSE IN COAL UTILIZATION, *University of Illinois, Urbana, Ill.*

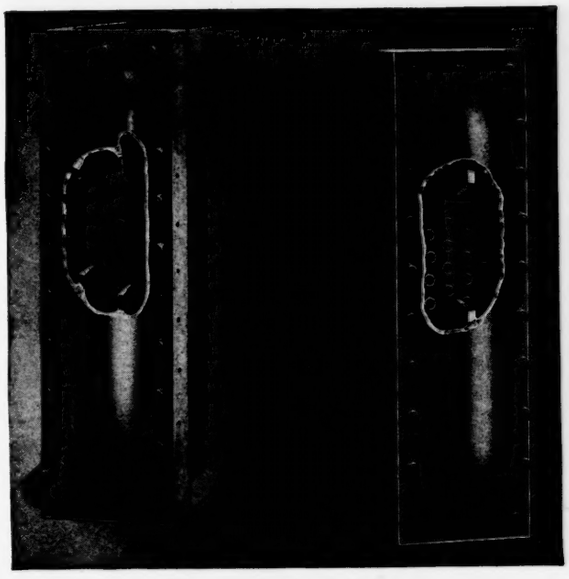
JUNE 1937. 31ST ANNUAL CONVENTION OF THE SMOKE PREVENTION ASSOCIATION, INC., *New York.*

AUGUST 3-7, 1937. POWER SHOW AND MECHANICAL EXPOSITION, *The Universal Craftsmen Council of Engineers of the World, Hotel Stevens, Chicago, Ill.*

OCTOBER 5-8, 1937. 66TH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, *New York City.*

NOW
CLEANABLE TUBE
AEROFIN

With Removable Headers Simplifies Cleaning of Tube Interior



LEFT: Water connection end of unit showing baffles for 18-tube single pass. For 36 tubes double pass, center baffles only used. RIGHT: Rear end for 18-tube single pass. For 36 tubes double pass, baffle omitted.

Aerofin Cleanable Tube units, for heating and cooling with water, have been designed for use where the prevalence of sediment or scale-forming chemicals in the water, makes periodic cleaning necessary.

Now, by the simple removal of a few bolts, both end headers may be disengaged, exposing the ends of all tubes.

Headers are designed so that water may be circulated in single or double passes (18 or 36 tubes in parallel) making possible the use of large quantities of water with small head loss. Send for descriptive folder.

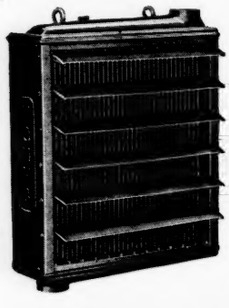
AEROFIN is sold only by Manufacturers of Nationally Advertised Fan System Apparatus.

AEROFIN CORPORATION
850 Frelinghuysen Avenue
Newark NJ
Chicago Detroit New York Philadelphia

Preliminary Degree-Day Figures for December, 1936

The table below gives degree-day figures for December for 48 important cities. These figures are preliminary, based on wired reports, and will be followed in next month's issue by final figures. Final figures for November, 1936, appear on page 138

Albany, N. Y.	985	Little Rock, Ark.	559
Atlanta, Ga.	566	Los Angeles, Calif.	187
Baltimore, Md.	738	Memphis, Tenn.	553
Birmingham, Ala.	482	Milwaukee, Wis.	1000
Boston, Mass.	886	Minneapolis, Minn.	1289
Buffalo, N. Y.	953	Nashville, Tenn.	645
Cheyenne, Wyo.	1047	New Haven, Conn.	846
Chicago, Ill.	913	New Orleans, La.	284
Cincinnati, Ohio	844	New York, N. Y.	760
Cleveland, Ohio	872	Oklahoma City, Okla.	637
Columbus, Ohio	866	Omaha, Neb.	1060
Denver, Colo.	868	Philadelphia, Pa.	757
Des Moines, Iowa	1030	Pittsburgh, Pa.	909
Detroit, Mich.	996	Portland, Me.	1004
Dodge City, Kan.	811	Portland, Oreg.	644
Duluth, Minn.	1430	Richmond, Va.	730
El Paso, Tex.	546	St. Louis, Mo.	755
Erie, Pa.	909	Salt Lake City, Utah	946
Evansville, Ind.	735	San Francisco, Calif.	406
Fort Wayne, Ind.	946	Scranton, Pa.	927
Grand Rapids, Mich.	968	Seattle, Wash.	623
Harrisburg, Pa.	874	Spokane, Wash.	964
Indianapolis, Ind.	849	Washington, D. C.	773
Kansas City, Mo.	806	Wichita, Kan.	768



UNIT HEATERS - BLAST HEATERS - COMMERCIAL HEAT TRANSFER SURFACES

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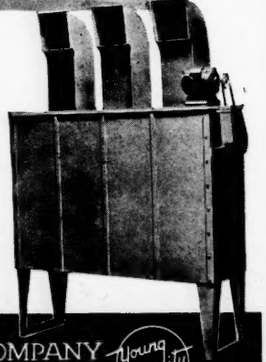

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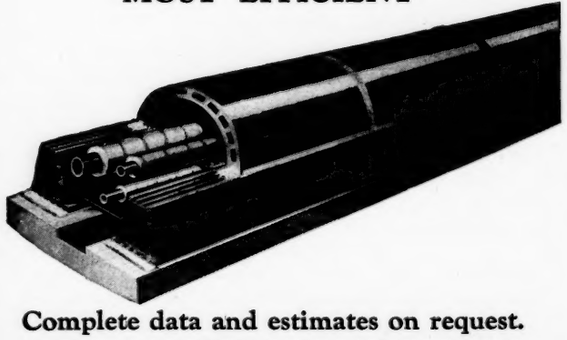

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NEW CATALOGS

(Unless otherwise indicated the publishers of catalogs will supply copies on request without charge.)

American Radiator Co., 40 West 40th St., New York, has published an attractive standard-size, four-color pamphlet entitled "This New Comfort—Air Conditioned." Pamphlet lists and describes the American Radiator air conditioning system.

Cameron Pump Div., Ingersoll-Rand Co., 11 Broadway, New York, has published a standard-size, 16-page bulletin, No. 7066. covering its line of coupled pumps. These pumps can be used for handling nearly all liquids and have capacities ranging from 150 to 5,000 g.p.m. against heads between 20 and 250 ft. Many views of pump installations as well as the construction details of the coupled pump are shown.

Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago. A standard-size, 48-page catalog, No. 125, on unit heating. Includes description of the various types of Ilg unit heaters and a considerable amount of operating data. Also includes a large amount of information on estimating heat requirements, determining location of units for industrial heating, office heating, and school heating. Information on piping methods and sizing steam pipe is also presented.

Link-Belt Co.. Stoker Div., 2410 W. 18th St., Chicago, Ill., has published a 20-page book, No. 1619, on automatic coal stokers for industrial and commercial use in capacities up to 300 hp. The booklet is standard size and is spirally bound. Among the subjects discussed are combustion cycle; burning heads; variable intermittent drive; and automatic air control.

National Bureau of Heating and Air Conditioning, Chicago Committee, has published a standard-size booklet, Personalized Weather As You Like It. This booklet deals with air conditioning for radiator heat. The booklet is being distributed by the Chicago Master Steam Fitters' Association, 220 North LaSalle St., Chicago.

National Fan & Blower Corp., Chicago, Ill., has published an eight-page standard booklet on its line of unit heaters—propeller and blower types. This describes the essential features of the equipment and gives capacity tables and dimensional data.

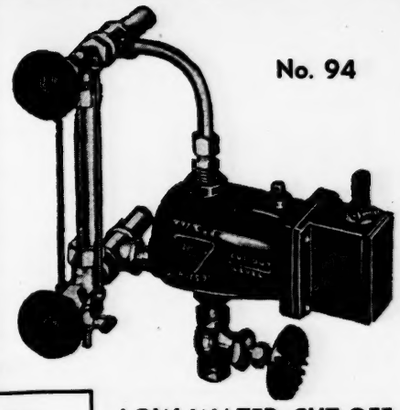
National Radiator Corp., Johnstown, Pa., has published an eight-page bulletin on the National Unitem submerged water heaters, both tank and tankless types, which are designed for use in National steel boilers. Booklet describes the outstanding features of this line of heaters and gives information on how to determine hot water requirements. A number of typical installations are also included.

The B. F. Sturtevant Co., Hyde Park, Boston, Mass., has published a 28-page booklet describing its lines of electrical fans and blowers applicable to ventilating individual rooms or limited areas and other allied air moving purposes. All of these fans or blowers are small or of the medium size. This is intended to be a workable catalog from which the correct size and type of fan can readily be selected for any job.

Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo., has published a series of standard-size, loose-leaf bulletins on motor applications. The first of these is a four-page pamphlet which deals with motor applications on air conditioning equipment while the second takes up motor application for compressors, ammonia, gas and large refrigerant compressors.

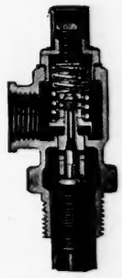
Worthington Pump and Machinery Corp., Harrison, N. J. A standard-size, four-page bulletin, W-321-B4B, describing the 3-DE monobloc centrifugal pumping unit. Includes information on sizes and capacities of the unit.

WATTS *Protective Devices*



No. 94

LOW WATER CUT-OFF



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Automatic firing has made imperative boiler water level protection . . . necessitating a Low Water Cut-off or Feeder and Low Water Cut-off.

In the No. 94 Low Water Cut-off, pictured in center above, Watts offers the last word in new engineering design, accessibility and simplicity.

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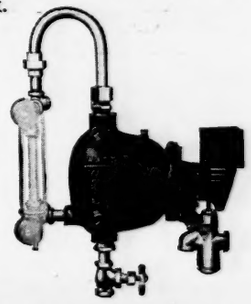
For service and complete satisfaction always specify a Watts Unit.

NO. 60 LW.
Boiler Water Feeder and Low Water Cut-off. Complete with fittings for gauge glass installation. Equipped with LW Switch.



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